U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Wildlife Services

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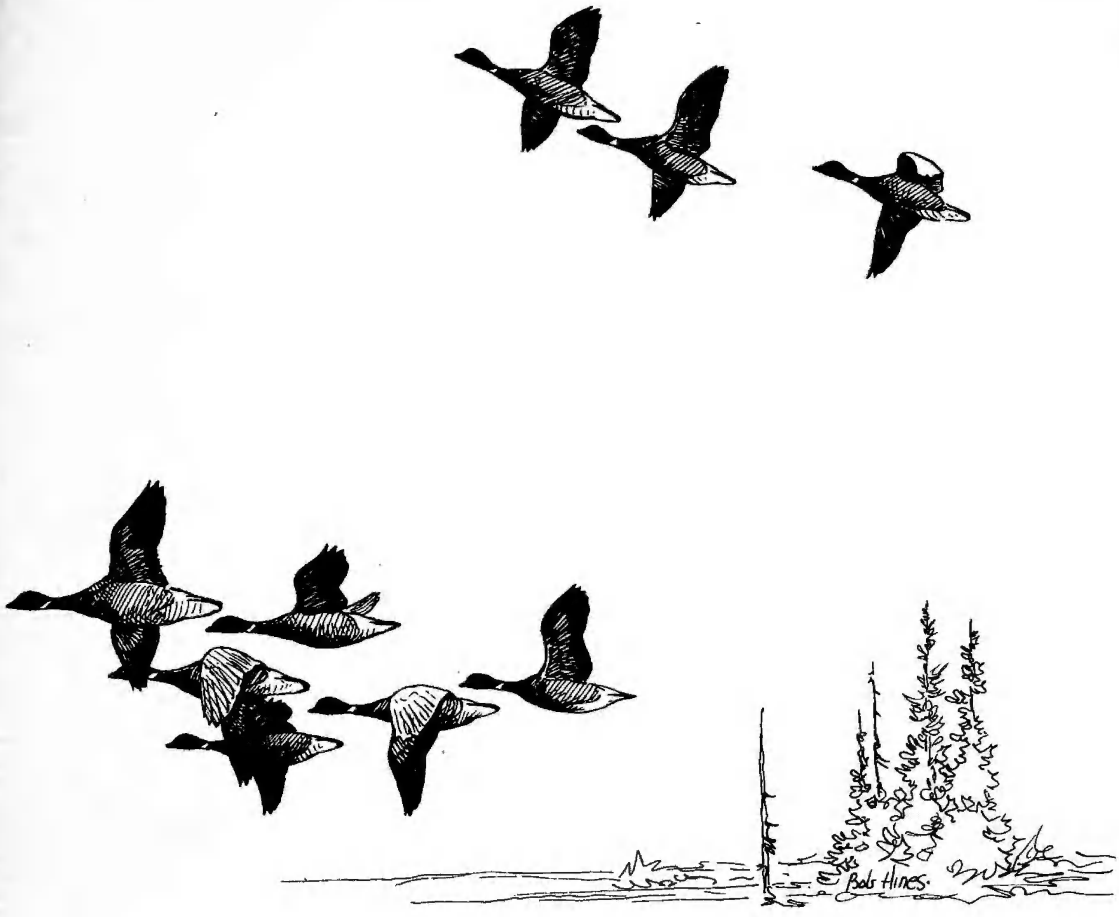
WATERFOWL POPULATIONS AND BREEDING CONDITIONS - SUMMER 1953



Special Scientific Report - Wildlife No. 25

United States Department of the Interior . . . . . Douglas McKay, Secretary
Fish and Wildlife Service . . . . . John L. Farley, Director

Canadian Department of Northern Affairs
and National Resources . . . . . Hon. Jean Lesage, Minister
Canadian Wildlife Service . . . . . W. Winston Mair, Chief

Washington, D. C. - April 1954

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FOREWORD

This is a compilation of reports on waterfowl breeding ground conditions in 1953. It is a joint compilation by the Canadian Wildlife Service and the United States Fish and Wildlife Service and many Provincial and State Game Departments. It is published as the seventh report in a series begun in 1947 to record annual breeding ground conditions for our migratory waterfowl.

John L. Farley, Director
Fish and Wildlife Service

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WATERFOWL BREEDING GROUND SURVEY, 1953 in ALASKA

Urban C. Nelson

Introduction

Since 1949 Fish and Wildlife Service personnel have flown aerial transects over some of the known important breeding grounds in Alaska for the purpose of securing an index to waterfowl populations and yearly trends for predicting fall populations. While the method employed provided indices for local areas it was not known if these indices reflected population levels in all of Alaska. In an effort to secure an Alaska wide index to waterfowl levels and to standardize, improve and simplify procedure, the 1953 aerial surveys were conducted on a uniform sampling basis somewhat different than in previous years. A map was prepared delineating or stratifying areas by estimated "breeding pairs of game ducks per square mile" and random sample transects flown in all areas with the number of transects dependent on the size of the area and the waterfowl per square mile.

Nesting studies and banding work were conducted on the Minto Lakes area near Fairbanks, Alaska under the direction of Dr. John Buckley of the Alaska Cooperative Wildlife Research Unit. The field work by Dr. Brina Kessel, assisted by Robert A. Hinman and Peter E. K. Shepard, consisted of studies of population levels, nesting and hatching success and methods of distinguishing ducklings of Lesser from Greater Scaup.

Sigurd T. Olson assisted by Calvin Elshoff and John Harris secured hatching success and production data and banded on the Copper River Delta.

Nesting studies and banding work was carried out on the Fort Yukon Flats on the Upper Yukon for the first time this year by Calvin J. Lensink.

Paul Adams continued the summer waterfowl surveys and banding on the Lower Yukon-Kuskokwim Delta for the 5th year. Efforts were concentrated on the brant and cackling goose concentrations.

Methods Used in Sampling and Area Covered

Aerial Surveys

On the basis of previous surveys and reports, climatic and topographic features, a map of Alaska was prepared segregating waterfowl population density areas by 1, 2, 5, 10 and 25 ducks per square mile. Flight routes were laid out on a random basis, equally spaced, parallel in pattern and at right angles to the direction of major drainage. Randomness of the system, to insure data amenable to statistical analysis, was provided for by a random point of beginning. Flights were made on a time basis or between landmarks, or a combination of both. Uniform widths of 1/4-mile were used and by using transects 16 miles long the data was easily converted to a square mile basis. The survey was made at a time designed to cover the period of egg laying or incubation. Only breeding pairs of mallard, pintail, teal, baldpate, shoveler, gadwall, scaup, goldeneye, bufflehead, and canvasback were counted. Single ducks were recorded as a pair and flocks of 11 or more birds were considered non-breeders and not counted.

Table I. - Waterfowl Breeding Ground Transects Flown 1953, Alaska

Area	Pilot	Observers	Aircraft	No. 16 Mi. Transects	Date
Kenai	Refuge Sup. David L. Spencer	Refuge Mgr. James Petersen	Piper Cub	5	6/8
Fort Yukon				33	5/29-30
Innoko	Ass't. Leader,	Wildlife Mgt.	Stinson	14	6/1-2
Manley-Ruby	Federal Aid	Supervisor		9	6/1
Koyukuk	Robert F. Scott	W. A. Elkins	Station Wagon	16	6/4
Marshall-Unalakleet				14	6/2-3
Kobuk & Selawick					
Yukon Delta	Enforcement Agent Lyman Reynoldson	Refuge Mgr. Paul Adams	Cessna 170	51	6/3-8
Nushagak	Enforcement Agent	Ass't. Leader	Piper Pacer	9	6/1-2
Platinum-Dillingham	Robert Mahaffey	Federal Aid Edward F. Chatelain		7	6/1
Alaska Pen.	James Hickey	Edward F. Chatelain & Refuge Mgr. Russell Hoffman	Grumman Goose	23	6/2-4
Susitna	Roger W. Allin	Gordon Watson	Piper	6	6/4-5
Lake Louise	Biologist Federal Aid	Biologist River Basins	Pacer	24	6/1-2
Minto Flats and	Enforcement Agent	Dr. John Buckley	Piper Pacer	13	6/1
Tanana-Kuskokwim	Raymond Trembley & Predator Control Agent Joe E. Miner	& Dr. Brina Kessel Coop. Wildlife Res. Unit	Piper Pacer	47	5/29-6/3
Copper River Delta	Warren W. Nystrom	Enf. Agent C. J. Stovall	Grumman Widgeon	17	6/13

Total: 288 Transects
4,608 Lineal Miles
1,152 Square Miles

The results of the survey showed some inaccuracies in the stratification and following statistical analysis, changes in the sampling plan may be required before the survey is justified as a basis for determining breeding populations.

Ground Surveys

Ground work on the Yukon Delta was started in 1949 and continued through this year. Adams devoted much of his time to observations on the nesting and hatching activities in the goose and brant grounds. Observations were made on clutch size, hatching success, brood sizes and factors of weather, predation, and diseases likely to affect production.

The Minto Lakes and Fort Yukon studies covered the entire season from the first egg laying to the flying stage with late season work devoted to banding. Sample air and ground counts over the same area were made to determine breeding pairs and number of broods.

The July-August work on the Copper River was devoted to determining production and to banding work.

Weather and Water Conditions

An early break-up occurred over most of Alaska. Light precipitation during the winter resulted in lower water stages over the interior drainages. High flood stages did not occur and water levels dropped consistently through the summer to levels lower than normal. Water area is not critical and since the lowered levels avert some nesting losses from flooding the waterfowl production was not adversely affected. The Lower Yukon and Copper River areas experienced a warm, storm-free nesting season.

Breeding Population Trends

The data obtained from the breeding ground aerial surveys is not comparable with previous years' work and accordingly is omitted here. Ground observations showed a reduction in waterfowl numbers on the Minto Lakes area but in other areas no significant changes over previous years were noted. At Minto, with greater effort, only 17 nests were located compared to 93 in 1952; drives to capture birds at 6 locations showed only 130 birds compared to 603 in 1952.

Table II. - Clutch Size, Alaska, 1951 and 1953 - Ground Surveys - Average Number of Eggs per Nest and Number of Nests Observed

	Yukon Delta		Minto Lakes		Fort Yukon
	1951	1953	1951	1953	1953
Black Brant	3.5 (116)	3.9 (98)	-	-	-
Cackling Goose	4.0 (97)	4.3 (55)	-	-	-
Baldpate	-	-	7.5 (2)	8 (1)	7.7 (3)
Mallard	-	-	8.6 (5)	8 (1)	7.0 (1)
Pintail	-	-	6.2 (14)	7 (2)	6.8 (9)
Shoveler	-	-	8.3 (7)	-	10.8 (5)
Canvasback	-	-	9.0 (1)	-	8.9 (11)
Lesser Scaup	-	-	8.4 (59)	8.5 (4)	9.5 (16)

Table III. - Brood Size, Goose and Brant, Alaska, 1951 - 1953 -- Ground Surveys
Average Size and Number of Broods Observed

	1951	1952	1953
Copper River - Canada Goose	-	5.4 (12)	4.3 (31)
Yukon Delta - Black Brant	3.4 (298)	-	2.8 (143)
Cackling Goose	3.7 (123)	-	4.5 (24)

Table IV. - Brood Size, Ducks, Alaska - Ground Surveys - Average Size and
Number of Broods Observed 1951 - 1953

	Fort Yukon	Minto Lakes		Copper River Delta	
Species	1953	1952	1953	1952	1953
Baldpate	7.2 (51)	5.9 (8)	7.3 (38)	-	8.1 (2)
G-w. Teal	8.2 (8)	7.7 (7)	7.2 (18)	-	6.0 (1)
Mallard	7.4 (11)	-	5.5 (8)	5.3 (3)	6.1 (18)
Pintail	6.6 (31)	5.8 (8)	5.6 (35)	5.0 (4)	5.5 (66)
Shoveler	8.3 (7)	7.3 (7)	7.5 (12)	5.0 (1)	5.2 (4)
Scaup	8.1 (24)	6.6 (46)	7.6 (106)	-	6.5 (18)

Table V. - Species Composition, Aerial Surveys, Alaska, 1952-1953

Yukon-Kuskokwim Delta	Percent in 1952	Percent in 1953
Percent Identified	97	93
Cackling Goose	31	41
Black Brant	7	10
Emperor Goose	10	12
White-fronted Goose	10	3
Pintail	4	11
Scaup	10	2
Scoter and Eider	14	7
Others	13	7
Copper River Delta		
Percent Identified	90	91
Canada Goose	36	24
Pintail	13	14
Mallard	15	19
Baldpate	7	9
Shoveler	7	6
Scaup	15	9
Other	7	10

Table V. - (continued)

Table V. - Species Composition, Aerial Surveys, Alaska, 1952-1953 (continued)

Fort Yukon Flats	Percent in 1952	Percent in 1953
Percent Identified	11	47
Pintail	18	23
Scaup	19	64
Baldpate	9	3
Mallard	-	7
Other	54	2
Minto Lakes		
Percent Identified	50	74
Pintail	32	6
Scaup	53	62
Baldpate	3	8
Mallard	2	4
Shoveler	-	3
Other	10	8

Significance of the Data

Aerial Surveys - Breeding Pairs

Since the methods used in 1953 differ from previous years the data are not directly comparable but where data can be segregated, no significant change in numbers of breeding birds can be detected except in the Minto Lakes area where there was a reduction in breeding pairs.

Size of Clutches and Broods

The size of brant and cackling geese clutches in 1953 was significantly higher than in 1951, however, the size of brant broods show a decrease and the cackling goose broods show an increase. Brood counts on these species are not reliable because of mixing of broods and it is believed that the increase in size of clutches reflects the good production observed on the Yukon Delta ground surveys.

The size of Canada goose broods as well as number of geese observed on the Copper River reflects a slight reduction in production for this species.

Duck clutches were as large or larger on the Minto, Copper River, and Fort Yukon areas in 1953 as in previous years of record.

Changes in composition by species is reflected in aerial surveys, however, subsequent ground surveys have shown considerable variation in composition counts, air vs. ground counts, and accordingly no conclusions are drawn from the data available.

Field work yielded significant information on waterfowl other than production. Adams collected further information on gull-waterfowl populations and predation. Dr. Kessel advanced work on identification of ducklings of Greater vs. Lesser Scaup.

Lensink initiated studies and banding on the Fort Yukon Flats for the first time. Olson and Robards located two gadwall nests, observed gadwall broods and banded 10 of these birds.

Banding

Table VI. - Birds Banded in Alaska, 1953

Species	ADULTS			IMMATURE			Total
	Male	Female	Sex Not Determined	Male	Female	Sex Not Determined	
Geese and Brant:							
Western Canada	32	32	81	128	121	88	482
Lesser Canada	-	-	-	2	3	-	5
Cackling	-	-	-	3	3	-	6
Black Brant	88	109	-	-	-	-	197
Total Geese and Brant	120	141	81	133	127	88	690
Ducks:							
Pintail	23	4	-	134	107	4	272
Baldpate	41	8	-	112	93	-	254
Mallard	3	3	-	47	37	-	90
G-w. Teal	6	-	-	5	9	-	20
Shoveler	-	1	-	29	26	-	56
Gadwall	4	-	-	3	3	-	10
Lesser scaup	3	7	-	96	83	3	192
Greater scaup	1	4	-	18	24	-	47
Unidentified scaup	-	-	-	17	9	-	26
Canvasback	-	-	-	9	16	-	25
Bufflehead	7	-	-	-	-	-	7
Total Ducks	88	27	-	470	407	7	999
Other Birds	-	-	-	-	-	-	955
Total - All Birds							2,644

WATERFOWL BREEDING GROUND SURVEY IN NORTHERN ALBERTA, THE NORTHWEST TERRITORIES, AND THE YUKON 1953

Robert H. Smith and Everett L. Sutton

Introduction

This report covers the sixth consecutive aerial survey of waterfowl populations in northern Alberta, northern Yukon, and parts of the Northwest Territories. Our objective was to obtain comparative data of breeding waterfowl populations of broad habitat categories and to do exploratory work in areas not previously surveyed. By following this procedure we hope to eventually obtain complete coverage of the far northern breeding grounds and at the same time collect comparative data useful in formulating regulations.

The writers began the population surveys on June 5 just north of latitude 54° N. in eastern Alberta, working on down through the MacKenzie River drainage to the Arctic coast, and in addition covering northern Yukon territory and the Anderson River drainage. These surveys were completed on June 27 at Aklavik, Northwest Territories.

Due to delays caused by bad weather and repairs to the aircraft, the exploratory work was not begun until July 13. Surveys were run on the Thelon River from near its source to Baker Lake, on the south coast and south central sections of Victoria Island, on the drainage systems of the Perry, Ellice, and Kugaruk Rivers, and on Pelly and Garry Lakes on the upper Back River. This phase of the work was concluded at Churchill, Manitoba, on July 27.

Methods Used in Sampling and Areas Covered

The techniques employed in the population surveys have not changed since they were begun in 1948, but intensity of sampling was increased in most areas to meet certain prescribed standards of accuracy. The brood surveys were discarded in favor of the exploratory work as it was felt that the latter was most important, and the time factor did not permit both.

The accompanying map illustrates the areas sampled and routes flown. The areas covered for the first time, with the exception of the Closed Forest strata of northern Alberta, are primarily goose-breeding areas, and total goose counts were made on the Thelon River drainage from Eyeberry Lake through Aberdeen Lake, Pelly and Garry Lakes on the Back River drainage, and on the Perry, Ellice, and Kugaruk Rivers draining north to Queen Maud Gulf. We believe that such counts will provide better indices to goose-breeding populations than random sampling across areas of scattered nesting, as most geese bring their broods to the larger rivers during the brooding season.

Thelon River, one of the principal rivers draining into Hudson Bay, heads in the rocky Precambrian plateau east and south of Great Slave Lake. Above its junction with the Darrell it runs through rough, rocky terrain; below there, it winds through broad tundra meadows with patches of spruce timber scattered throughout

the valley almost to Beverly Lake. On both sides of the valley the land rises to bleak Precambrian barrens -- the valley itself is rich by comparison. In its lower section, from Grassy Island down, the current is relatively slow-moving, and the river contains several sub-deltas with numerous channels and islands. Geese were encountered from Eyeberry Lake all the way through to the western section of Aberdeen Lake. In all, 20 snow geese, 87 white-fronts, and 8,576 Canada geese were recorded.

Perry, Ellice, and Kugaruk drainages, lying east of the high, rugged upland boardering Bathurst Inlet, were surveyed throughout from source to mouth. All drain north to Queen Maud Gulf, entering the sea along a low coast indented with shallow bays and containing many islands. The Perry is the longest, coming off the rugged Precambrian plateau to the south, and is quite deeply entrenched in most of its upper reaches. In its lower course it flows through broad tundra meadows. The Ellice and Kugaruk are shorter and for the most part wander through broad tundra meadows. Consequently, they are much better goose areas than the Perry. All flow through a region of innumerable lakes, many of which contain geese. On the Perry we recorded 380 Canada geese, 258 white-fronts, and 180 white geese; on the Ellice, 21 white geese, 113 white-fronts, and 2,526 Canada geese; on the Kugaruk 2,155 geese of all species. Near the coast, a few black brant were present.

The rivers draining to the south coast of Victoria Island, although very short, were all found to have small numbers of geese--Canadas, white-fronts, and black brant.

Breeding Population Trends

The transect sample figures for which there are comparative data are listed in the following tables:

Table I. - Lake Claire,- Athabaska Delta, Alberta*

	1948	1949	1950	1951	1952	1953
Ducks Per square mile	41	177.4	66.4	37.1	57.8	51.4
Est. breeding pop. index	82,000	354,800	132,800	74,200	115,600	102,800
Percent change from former years		+ 333	-62.6	- 44	+ 56	- 11

*Estimated area 2,000 square miles.

Percent Species Composition, 1953

Species	Percent	Species	Percent
Pintail	26	Blue-winged teal	2
Mallard	25	Scoter	2
Scaup	12	Gadwall	1
Shoveler	10	Green-winged teal	1
Baldpate	7	Ruddy duck	1
Redhead	6	Goldeneye	1
Canvasback	5	Bufflehead	1

Table II. - Hay Lakes, Alberta *

	1950	1951	1952	1953
Ducks per square mile	124.6	84.3	243.7	129
Est. breeding pop. index	24,920	16,860	48,740	25,800
Percent change from former years		- 32	+ 189	- 47

Percent Species Composition, 1953

Species	Percent	Species	Percent
Mallard	32	Shoveler	4
Pintail	13	Scoter	4
Canvasback	10	Goldeneye	3
Baldpate	9	Green-winged teal	2
Scaup	8	Blue-winged teal	1
Redhead	8	Ruddy duck	1
Bufflehead	5		

* Estimated area 200 square miles.

Table III. - Slave River Parklands, N. W. T. *

	1948	1949	1950	1951	1952	1953
Ducks per square mile	4.3	6.8	5.7	7.7	3.4	3.2
Est. breeding pop. index	17,306	27,370	22,943	30,993	13,685	12,875
Percent change from former years		+ 58	- 16	+ 29	- 56	- .6
Canada geese per square mile	--	--	--	.06	--	.03
Est. goose breeding pop. index	--	--	--	242	--	121

Percent Species Composition, 1953

Species	Percent	Species	Percent
Scoter	37	Mallard	6
Pintail	11	Green-winged teal	6
Baldpate	11	Goldeneye	6
Scaup	11	Shoveler	1
Bufflehead	11		

* Estimated area 4,025 square miles.

Table IV. - Precambrian Forest and Forest Tundra *

	1949	1950	1951	1952	1953
Ducks per square mile	11.6	14.7	10.0	11.3	6.9
Est. breeding pop. index	805,933	1,021,312	694,770	785,090	479,391
Percent change from former years		+ 27	- 32	+ 13	- 40

Percent Species Composition, 1953

Species	Percent	Species	Percent
Scaup	41.6	Baldpate	1.0
Scoter	36.0	Pintail	0.5
Old squaw	9.0	Bufflehead	0.5
Merganser	8.0	Goldeneye	0.5
Mallard	2.7	Green-winged teal	0.2

*Estimated area 69,477 square miles.

Table V. - Closed Forest - 60° - 63° 30' N., N. W. T. *

	1949	1950	1951	1952	1953
Ducks per square mile	5.7	9.3	7.1	11.8	3.6
Est. duck breeding pop. index	236,350	385,624	294,402	489,287	149,274
Percent change from previous year		+ 63	- 24	+ 66	- 70
Canada geese per square mile	.26	1.2	0.7	0.93	.28
Est. goose breeding pop. index	10,780	49,758	29,025	38,562	11,610
Percent change from previous year		+ 362	- 42	+ 33	- 70

Percent Species Composition, 1953

Species	Percent	Species	Percent
Scaup	35	Bufflehead	4
Mallard	18	Shoveler	1
Pintail	14	Green-winged teal	1
Scoter	14	Goldeneye	1
Old squaw	7	Merganser	1
Baldpate	4		

* Estimated area 41,465 square miles.

BREEDING GROUND SURVEY IN NORTHWESTERN CANADA - 1953

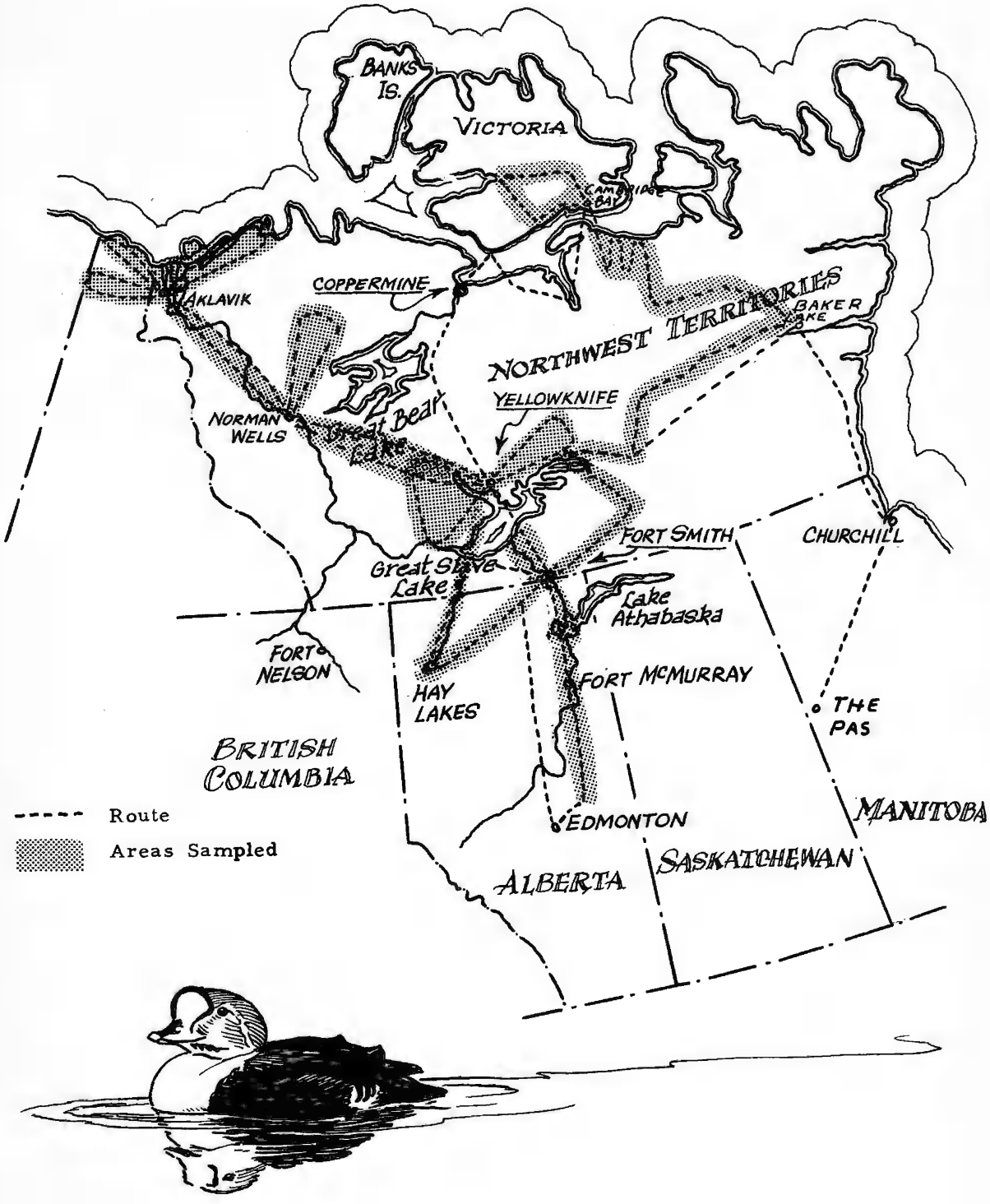

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Table VI. - Precambrian Edge, N. W. T. *

	1950	1951	1952	1953
Ducks per square mile	29.4	27.5	26.1	27.6
Est. breeding pop. index	211,092	197,450	187,398	198,168
Percent change from previous years		- 6.5	- 5	+ 6

Percent Species Composition, 1953

Species	Percent	Species	Percent
Scaup	68	Pintail	2
Scoter	16	Green-winged teal	2
Mallard	5	Bufflehead	2
Baldpate	4	Shoveler	1

*Estimated area 7,180 square miles.

Table VII. - Wooded Delta MacKenzie River, N. W. T. *

	1948	1949	1950	1951	1952	1953
Ducks per square mile	27.7	31.8	21.2	26.7	32.7	26.8
Est. breeding pop. index	99,720	114,480	76,320	96,120	117,720	96,480
% change from previous year		+ 15	- 33	+ 26	+ 22	- 18
Swans per square mile	1.5	.04	1.7	.23	.19	.08
Est. breeding pop. index	5,400	144	6,120	828	684	288
% change from previous year		- 97	+ 325	- 86	- 17.4	- 60

Percent Species Composition, 1953

Species	Percent	Species	Percent
Scaup	40	Green-winged teal	2
Scoter	24	Canvasback	1
Baldpate	11	Goldeneye	1
Mallard	10	Merganser	1
Pintail	10		

* Estimated area 3,600 square miles.

Table VIII. - Treeless Delta MacKenzie River, N. W. T. *

	1948	1949	1950	1951	1952	1953
Ducks per square mile	25.2	38.1	43.4	26.0	14.1	29.5
Est. breeding pop. index	40,320	60,960	69,440	41,600	22,560	47,200
% change from prev. years		+ 51	+ 14	- 40	- 45	+ 109
Swans per square mile	1.4	0.9	0.8	3.2	1.4	1.1
Est. Breeding pop. index	2,240	1,440	1,280	5,120	2,240	1,760
% change from prev. years		- 36	- 11	+ 300	- 56	- 21
Canada geese per sq. mile	.03	.03	.01	.07	1.2	.37
Est, breeding pop. index	48	48	16	112	1,920	592
% change from prev. years			- 67	+ 600	+1,700	- 70
W-F. geese per sq. mile	.06	.04	.02	0.3	0.5	.02
Est. breeding pop. index	96	64	32	480	800	32
% change from prev. years		- 33	- 50	+1,400	+ 66	- 96

Percent Species Composition, 1953

Species	Percent	Species	Percent
Pintail	55	Old squaw	4
Scaup	12	Canvasback	3
Baldpate	9	Shoveler	1
Mallard	8	Merganser	1
Scoter	7		

* Estimated area 1,600 square miles.

Table IX. - Upland Tundra between MacKenzie and Anderson Rivers, N. W. T. *

	1948	1949	1950	1951	1952	1953
Ducks per square mile	35.4	32.6	32.8	46.2	17.5	23.3
Est. breeding pop. index	306,387	282,153	283,884	399,861	133,462	201,661
% change from prev. year		- 8	+ 1	+ 41	- 62.1	+ 33
Swans per square mile	1.2	1.0	1.0	2.8	.77	.9
Est. breeding pop. index	10,386	8,655	8,655	24,234	6,664	7,789
% change from prev. year		- 17	n.c.	+ 180	- 725	+ 17
Canada geese per sq. mile	.5	--	.04	.4	--	.08
Est. breeding pop. index	4,327	--	346	3,462	--	692
% change from prev. year		- 100	+ inf.	+ 1,000	- 100	+ inf.
W-F. geese per square mile	1.9	.7	2.5	1.5	1.1	.87
Est. breeding pop. index	16,444	6,058	21,637	12,982	9,520	7,530
% change from previous year		- 63	+ 257	- 40	- 28	- 21

Percent Species Composition, 1953

Species	Percent	Species	Percent
Scoter	55	Merganser	3
Scaup	20	Baldpate	2
Old squaw	13	Mallard	1
Pintail	6		

* Estimated area 8,655 square miles.

Table X. - Coastal Tundra between MacKenzie and Anderson Rivers, N. W. T. *

	1948	1949	1950	1951	1952	1953
Ducks per square mile	11.5	12.4	17.0	11.3	13.3	22.3
Est. breeding pop. index	10,350	11,160	15,300	10,170	12,105	20,070
% change from prev. year		+ 8	+ 37	- 34	+ 16	+ 68
Swans per square mile	1.6	1.7	1.8	1.3	2.3	1.8
Est. breeding pop. index	1,440	1,530	1,620	1,170	2,070	1,620
% change from prev. year		+ 6	+ 6	- 28	+ 77	- 22
W-F. geese per square mile	2.0	0.3	2.5	0.5	1.2	.67
Est. breeding pop. index	1,800	270	2,250	450	1,080	603
% change from prev. year		- 85	+ 733	- 80	+ 140	- 44

Percent Species Composition, 1953

Species	Percent	Species	Percent
Scoter	45	Pintail	4
Old squaw	30	Mallard	2
King eider	11	Merganser	1
Scaup	7		

*Estimated area 900 square miles.

Table XI. - Forest Tundra North of Willow Lake, N. W. T. *

	1948	1949	1950	1951	1952	1953
Ducks per sq. mile	12.4	8.9	13.2	17.0	25.6	10.4
Est. breeding pop. index pop. index	1,199,923	861,235	1,277,337	1,645,056	2,447,260	1,006,387
% change from prev. year		- 28	+ 48	+ 29	+ 50.6	- 59
Swans per square mile	.3	.4	.2	.3	.8	.1
Est. breeding pop. index	29,030	38,707	19,353	29,030	77,414	9,676
% change from prev. year		+ 33	- 50	+ 50	+ 167	- 89
Canada geese per sq. mile	--	--	--	.13	.1	.08
Est. breeding pop. index	--	--	--	12,580	9,676	7,741
% change from prev. year	--	- -	--	--	- 23	- 20

Percent Species Composition, 1953

Species	Percent	Species	Percent
Scaup	38.5	Mallard	4.4
Scoter	32.3	Merganser	1.3
Old squaw	11.0	Canvasback	.8
Baldpate	6.2	Goldeneye	.6
Pintail	4.8	Green-winged teal	.1

*Estimated area 96,768 square miles.

Table XII. - Old Crow Flats, Yukon Territory *

	1948	1949	1950	1951	1952	1953
Ducks per square mile	56.2	38.0	43.0	71.1	65.5	30.8
Est. breeding pop. index	110,714	74,860	84,710	140,067	129,035	60,676
% change from prev. year		- 32	+ 13	+ 65	- 8	- 53
Swans per square mile	--	--	--	.12	0.1	--
Est. breeding pop. index	--	--	--	236	197	--
% change from prev. year	--	--	--	--	- 17	- 100
Geese per square mile	2.4	2.2	1.8	.43	.33	.85
Est. breeding pop. index	4,728	4,334	3,546	847	650	1,675
% change from prev. year		- 8	- 18	- 76	- 23	+ 159

Percent Species Composition, 1953

Species	Percent	Species	Percent
Scoter	44	Canvasback	2
Scaup	26	Goldeneye	1
Pintail	12	Merganser	1
Baldpate	8	Shoveler	.5
Old squaw	3	Green-winged teal	.5
Mallard	2		

* Estimated area 1,970 square miles.

Table XIII. - Brant and Goose Populations on the Deltas of the MacKenzie, Kugaluk, and Anderson Rivers, and Cape Dalhousie

Species	1948	1949	1950	1951	1952	1953
Snow geese	7,320	2,943	5,390	7,360	9,489	8,580
Black brant	2,377	2,510	2,004	1,294	3,147	1,303
White-fronted geese	901	825	1,112	120	8	174
Canada geese	596	567	62	-	-	-

Weather and Water Conditions

The entire north country in which we worked experienced a very mild winter with little snow. Consequently, break-up was exceedingly early with little run-off. All the rivers were exceptionally low, and ice was clear of the lakes in the barrens adjacent to the MacKenzie by the middle of June -- almost a month early.

The lakes north of latitude 63° were low but still contained ample water. South of this line, in the area west of the Precambrian, drought conditions prevailed--forest fires were rampant and many shallow lakes and marshes completely dried up. This was in marked contrast to the prairie areas to the south which experienced flood conditions.

Until the middle of June exceptionally warm open weather prevailed. After that the normal arctic-type of weather set in with frequent storms--rain, fog and low clouds. None of the storms were violent enough, however, to have any noticeable effect on the hatch.

Success of the Season

As explained previously, no brood survey was made, consequently remarks concerning the success of the hatch must be of a general nature.

Being an early, dry season, no flooding occurred anywhere in the region, and an early hatch was evident. Geese of all species appeared to have had the best hatch since the studies were begun in 1948. Early duck broods were observed the first part of June. Possibly the drought in the southwestern section of the Northwest Territories and in northern Alberta had some harmful effects, but in general conditions for hatching and brooding were ideal.

Summary

Considering all the areas where comparable data are available, the duck population decreased 47 percent from 1952. The population index for 1952 was 4,501,940 as compared with 2,400,780 for 1953. Of the 1953 total, 59 percent was composed of species commonly shot for sport. Broken down by species the changes are as follows: Increases, mallard - 15 percent; gadwall - 48 percent; blue-winged teal - 43 percent; green-winged teal 24 percent; redhead - 11 percent; canvasback - 84 percent; and ruddy duck - 179 percent. Decreases, pintail - 37 percent; baldpate - 8 percent; shoveler - 27 percent; scaup - 52 percent; goldeneye - 56 percent; bufflehead - 56 percent; scoter - 61 percent; old squaw - 24 percent; merganser - 18 percent; and king eider - 36 percent. It should be pointed out that we are measuring gadwall, blue-winged teal, redhead, canvasback, and ruddy ducks on the edge of their range, so the figures obtained here are not significant for these species. Transect data on geese indicate a decrease of 58 percent in Canada geese, 28 percent in white-fronts, with no change in swans. Colonial nesting black brant and snow geese were down 58 percent and 9 percent, respectively.

AERIAL WATERFOWL BREEDING GROUND EXPLORATIONS IN SECTIONS OF THE FAR NORTH

Edward G. Wellein and Wesley Newcomb

Introduction

Aerial exploration surveys of the waterfowl breeding range in the Far North were conducted again this summer as part of the over-all Continental breeding ground survey program. The survey work, for the most part, was confined to the north central Arctic, but as is always the case, the range of the survey was limited by location and availability of gasoline supplies and by the cruising range of the aircraft. In general, an attempt was made to cover areas which had not been previously surveyed, although known concentration areas of geese were covered again to obtain data for comparative purposes.

The primary objective of the survey was to gather quantitative data on the distribution and the magnitude of the breeding population of ducks and geese in sections of the Arctic, together with information on breeding conditions. The accumulation of these data in the Far North over a period of years will make it possible to catalogue the important breeding areas for ducks and geese as well as those areas which are unproductive. From this information it may be possible to devise a sampling system which is physically as well as economically practicable. Information on other species of wildlife was also recorded and is discussed under Incidental Observations.

The survey this year was flown in Grumman Goose N 778, which is owned by the U. S. Fish and Wildlife Service. Edward G. Wellein and Wesley Newcomb of the Fish and Wildlife Service acted as pilot and observer respectively. Altogether, approximately 75 hours and 10,000 miles were flown on the survey.

Weather and Water Conditions

"Summer" was later in the Arctic this year than it was in 1952, although it was about normal; last year the phenological progression of the season was much advanced. In early July this year ice was more prevalent in the larger inland lakes than it was in 1952. However, the season was not nearly as retarded as that of the summer of 1950. Strangely enough, pack ice was non-existent between Southampton Island and Chesterfield Inlet this year, whereas in 1952 this area was a continuous flow of ice. Baker Lake, for the most part, was still covered with ice on July 12 and water landings were possible only in an open area in front of the Post.

Waterfowl Populations Observed

During the survey flights, information on waterfowl was recorded on a 1/4-mile transect basis. Other information of an unusual or useful nature was also recorded and observations were not limited to only the transect. Table I shows the waterfowl density observed on the various flights. For the location of these transects, refer to the accompanying map.

AERIAL SURVEY ROUTES IN NORTH CENTRAL CANADA - 1953

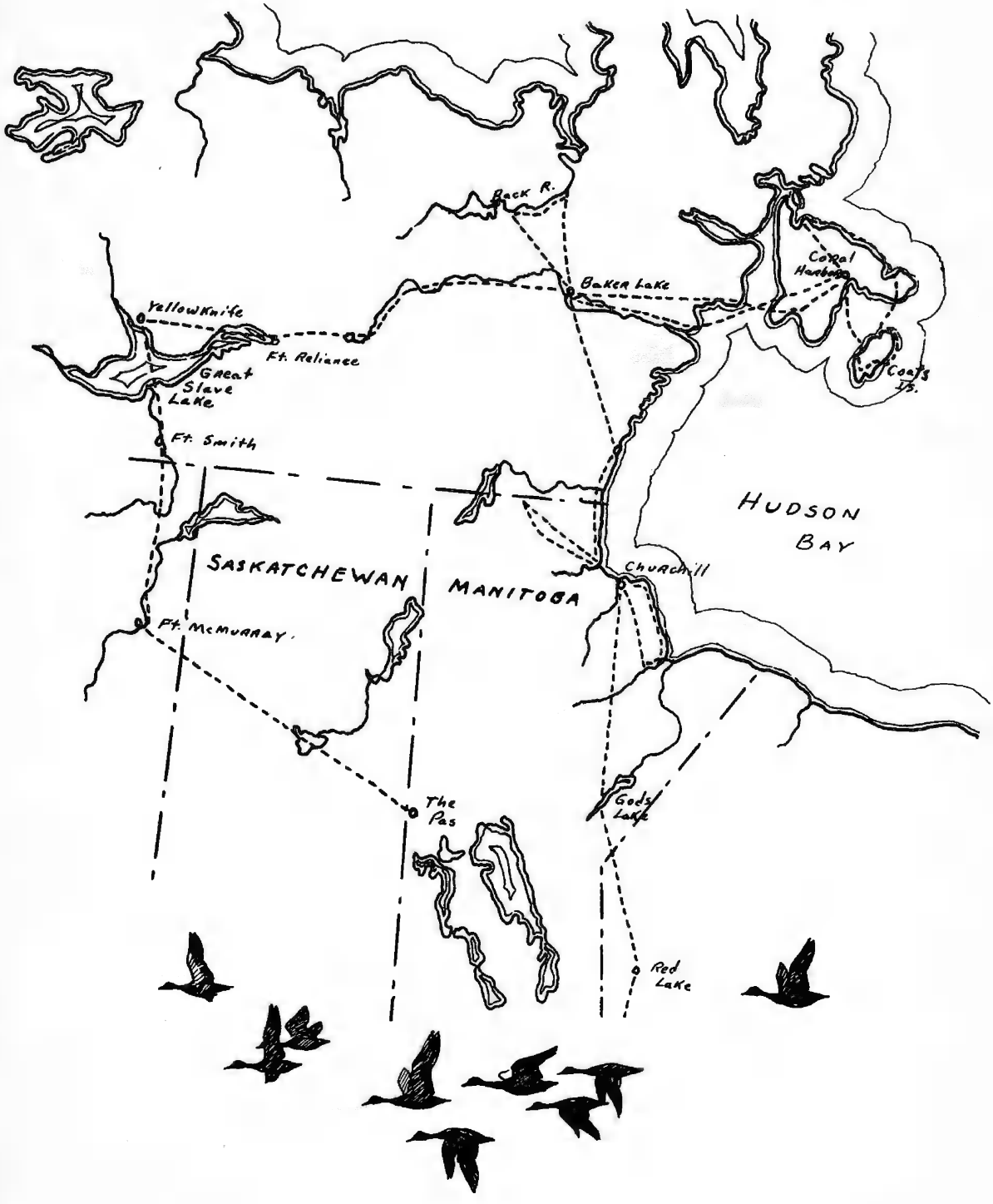

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Table I. - Waterfowl Populations Observed During Northern Exploratory Flight

Transect	No. Sq.Mi.	Ducks/ Mi^2	Sporting* Ducks/ Mi^2	% Sporting Ducks	Canada Geese** Recorded		Adult** Snow Geese Recorded
					Adults	Broods	
Ball Lake - God's Lake	70.0	0.57	0.24	41.7			
God's Lake - Churchill	78.7	2.23	1.37	61.6	14	2	
Churchill to Port Nelson return to Churchill	82.5	2.74	2.36	86.4	131	12	200
Churchill to Gellini Lake, return Churchill	100.0	0.59	0.32	54.4	5	1	
Churchill to Eskimo Pt.	50.0	7.24	6.82	94.2	88		15,000
Eskimo Pt. to Baker Lake	57.5	1.93	1.08	56.2	56		10
Baker Lake to Chantrey Inlet and return	110.0				3		
Baker Lake to Cape Kendall Southampton Island	70.0						2
Cape Kendall to Coral Harbor	31.3	0.45			5		25,000
Coral Harbor to Duke of York Bay, East Coast to Evans Strait	72.5	0.44					
Coats Island	37.5	0.75			2		4
Coral Harbor to Baker Lake via Chesterfield Inlet	100.0	0.12			21		
Baker Lake to Eyeberry Lake via Thelon River	87.5	0.75			2315		
Eyeberry Lake to Ft. Reliance	43.7	0.27	0.11	40.0			
Yellow Knife to Ft. Smith	50.0	0.82	0.82	100.0			
Baril Lake to Ft. McMurray	35.0	0.51	0.51	100.0			
Ft. McMurray to The Pas	112.5	3.90	3.82	98.1	6		

*Mergansers, Old Squaws, Scoters, and Eiders were not included as sporting ducks.

**Observation on geese not confined to 1/4-mile transect.

No sporting ducks were observed north of Eskimo Point on the coast and none north of the Thelon River in the interior. The most important ducks recorded north of these points was the Old Squaw. Eiders were observed only on the east coast of Southampton Island (total of 26), on Coats Island (total of 9), and at Chesterfield Inlet (total of 5).

Canada geese (probably the Lesser) were observed scattered in small groups as far north as the surveys were conducted. A large concentration (well over 2,000) was observed in the Beverly Lake area.

Snow geese were almost entirely confined to definite breeding colonies. The largest breeding concentrations observed were those in the McConnel River Delta near Eskimo Point, and the Boas River on Southampton Island. The numbers appeared to be about the same as last year, 15,000 and 25,000 respectively. This year, as in past years, many examples of a snow goose and a "blue" goose guarding the same nest or the same brood were observed, which suggests quite strongly that these two species are actually only one species. A small nesting colony of snow geese was observed about 20 miles east of Churchill between Norton Lake and La Perouse Bay. This area has been flown several times before (1950 and 1951), but the colony has not been previously recorded and appears to be a new development. Twenty-three nests and three broods of snow (and blue) geese were recorded in this area. The north and east coastline of Southampton Island was flown this year and no colonies of nesting snow geese were observed. Apparently the only nesting snow geese on this Island are in the vicinity of the Boas River Delta. Four snow and blue geese and two broods were recorded on the north side of Coats Island.

One of the greatest contributions of the Far North to the Continental waterfowl picture is in the production of geese. Breeding Canada geese, judging from the data gathered thus far, appear to be scattered over the entire north country. Because of the magnitude of the area involved, the population of Canada geese produced in the Far North must be large. Also the Arctic is solely responsible for the entire production of snow geese.

It is time to think about attempting to band geese on the Far North breeding grounds. Enough is now known of the location of some of the important Canada and snow geese concentration areas so that banding expeditions can be sent into this country with a reasonable assurance of success. Undoubtedly in the future other important concentration areas of breeding and moulting geese will be found. Band returns from these populations will yield valuable information as to the utilization and migration of these northern geese down the four flyways.

Incidental Observations

This year for the first time large numbers of white whales (Beluga) were observed in the vicinity of the mouth of the Seal River. As nearly as could be judged from the air, this concentration was considerably larger than the one in the Churchill River.

The Wilson River drainage was not covered this year and as a result, a large part of the caribou herd was not seen. Several thousand caribou were observed near Kaminak Lake and about 54,000 were recorded between Baker Lake and Aberdeen Lake on July 18. Four caribou were recorded on Coats Island, but none were observed on Southampton Island.

Several thousand murres were observed using the high cliffs on the northeast coast of Coats Island. On Walrus Island, a small island about 10 miles north of Coats Island, 30 walrus were recorded.

On the flight up the Thelon River from Beverly Lake to Eyeberry Lake 37 musk-oxen were observed. All musk-oxen seen were within one-fourth of a mile of the stream. Because only part of the stream was covered in the flight, a total count of these animals was not possible but the total is known to be considerably greater than 37 head.

WATERFOWL BREEDING GROUND STUDIES IN BRITISH COLUMBIA, 1953

R. H. Mackay
Canadian Wildlife Service

Weather and Water Conditions

An exceptionally mild winter in the interior of the Province left little moisture in the form of snow this spring. Water levels in creeks and potholes were considerably below normal in early May but good rains since that time have brought them up to average. Weather and water conditions were favourable to a successful hatch.

Breeding Population Trends

The spring aerial survey of the Cariboo, Chilcotin, and Prince George areas, as in previous years, was again made by running random transects. The size of the sample was increased somewhat this year. Comparable total waterfowl population figures were obtained in the spring aerial survey of the Upper Columbia Valley. Results of these aerial surveys which are tabulated in the following tables, show a considerable increase in the numbers of waterfowl on the breeding grounds. Canada geese increased notably in numbers.

Table I. - Spring Aerial Survey - Cariboo, Chilcotin, and Prince George Areas

	1950	1951	1952	1953
Square miles sampled	80.3	87.7	75.0	98.3
Ducks per square mile	9.1	11.3	8.5	10.4
Canada geese (total seen)	23	34	17	47

Table II. - Aerial Survey - Columbia Valley

	1950	1951	1952	1953
Ducks per square mile	19.9	10.1	12.0	19.5
Canada geese per square mile	20.1	17.4	19.7	25.3
Canada geese	1,612	1,395	1,575	2,025
Swan	2	10	1	1
Mallard	773	402	445	576
Baldpate	167	83	155	103
Green-winged teal	24	-	14	-
Blue-winged teal	83	7	1	-
Canvasback	27	3	-	10
Scaup	18	9	53	3
Goldeneye	79	97	65	91
Bufflehead	2	21	9	18
Others	49	33	88	49
Unidentified	376	135	130	705
Total Ducks	1,598	790	960	1,555

Ground surveys of sample areas have been restricted considerably this year due to the pressure of other duties. Only one summer count, in the Cariboo Parklands, has been made to date and this is recorded in Table III. The numbers of birds recorded this year are not strictly comparable with those obtained in previous years as the count was made 3 weeks earlier this year. The numbers of young birds recorded would undoubtedly be increased by the hatch of the late-nesting species. This hatch was just beginning to show up at the time of the count. The considerable drop in the numbers of adult birds recorded is not readily understood at this time.

Table III. - Mid-Summer Counts - Cariboo Parklands

Species	1951		1952		1953*	
	Adult	Young	Adult	Young	Adult	Young
Unidentified	-	-	102	7	-	-
Mallard	57	50	129	24	3	17
Pintail	1	-	10	9	2	4
Baldpate	63	67	28	64	11	53
Gadwall	2	16	1	-	1	8
Green-winged teal	14	37	28	32	4	30
Blue-winged teal	6	9	4	14	6	7
Shoveler	1	5	7	21	4	11
Redhead	21	67	10	72	12	69
Canvasback	9	22	35	27	8	37
Lesser scaup	174	293	212	257	138	87
Goldeneye	216	306	239	110	55	168
Bufflehead	42	36	110	68	27	99
Ruddy duck	36	16	89	19	65	19
Total Ducks	642	924	1,004	724	336	609
American Coot	369		283		310	

* 1953 count made 3 weeks earlier than previous years - not strictly comparable.

Success of the Season

A summary of the brood data available to date is shown in Table IV. The figures for 1953 are again not strictly comparable with those of previous years as all counts were completed earlier than usual. However, a successful hatch is indicated by the facts that more broods have been recorded on a smaller area this year and the sizes of the individual broods compare favourably with previous years.

Summary

Weather and water conditions were favourable to waterfowl production in British Columbia this year.

Spring aerial waterfowl surveys comparable with those made in previous years showed a considerable increase in the numbers of waterfowl, particularly Canada geese, on the breeding grounds.

Restricted mid-summer ground counts, not strictly comparable with those made in previous years, indicate a successful hatch this year. A reduction in the numbers of adult birds observed is not understood at this time.

Numbers of broods and the size of individual broods observed this year also indicate a successful hatch.

Table IV. - Summary of Brood Data *

Species	1950	1951	1952	1953
Mallard	7.5 (50)	6.3 (37)	4.9 (11)	6.4 (12)
Gadwall	5.0 (1)	6.0 (8)	7.0 (3)	8.0 (1)
Pintail	6.3 (22)	4.8 (9)	5.0 (3)	6.0 (3)
Green-winged teal	8.6 (8)	7.0 (7)	5.3 (6)	7.5 (4)
Blue-winged teal	7.9 (20)	7.8 (6)	7.0 (2)	7.0 (1)
Baldpate	7.6 (31)	5.9 (28)	6.2 (14)	6.6 (15)
Shoveler	6.1 (7)	6.4 (8)	6.3 (3)	3.7 (3)
All Pond Ducks	7.3 (139)	6.1 (103)	6.0 (42)	6.4 (39)
Redhead	5.7 (17)	6.7 (22)	7.5 (13)	6.2 (12)
Canvasback	8.7 (4)	8.4 (10)	6.2 (6)	5.7 (14)
Lesser scaup	8.3 (35)	7.7 (59)	7.5 (41)	8.2 (13)
B. goldeneye	6.5 (87)	6.0 (28)	4.8 (11)	6.0 (43)
Bufflehead	6.6 (27)	5.6 (6)	4.7 (3)	6.0 (22)
Ruddy duck	5.7 (30)	6.2 (17)	4.3 (9)	5.7 (4)
All Diving Ducks	6.6 (200)	7.0 (142)	5.8 (83)	6.4 (108)

* Bracketed figures refer to numbers of broods averaged.

WATERFOWL BREEDING GROUND SURVEY IN ALBERTA - 1953

Allen G. Smith and G. H. Jensen

The 1953 Alberta waterfowl survey was conducted with the following objectives in mind: (1) to evaluate the waterfowl breeding ground conditions in southern and central Alberta south of 54° N; (2) to appraise the waterfowl breeding populations and their species composition in this area; (3) to evaluate the production of this population; (4) to conduct a series of intensive ground studies in representative vegetative stratum for the purpose of gathering more detailed information relative to seasonal and weekly movements of waterfowl populations, species composition, nesting progress and success, production, and the influence of weather, agricultural practices, disease and predation on the populations under study; and (5) to band as many waterfowl (juveniles preferred) as possible for the purpose of gathering further data on the migrations of and the hunting pressures applied to the various species involved.

Aerial breeding population surveys were conducted with a Piper PA-18 Super Cub, piloted by G. H. Jensen with James Kelly, U. S. Fish and Wildlife Service, as observer. Production surveys were flown by G. H. Jensen with Allen G. Smith as observer. Five intensive ground study areas were established at the beginning of the season. Area 1 (Brooks-Suffield district) in Stratum A was under the observation of Mr. Fred Sharp, Ducks Unlimited (Canada). An operation in early summer caused the curtailment of Mr. Sharp's work on this area to a minimum. Detailed waterfowl studies on Area 2 (Strathmore district) also in Stratum A were conducted by Mr. George Freeman, Ducks Unlimited (Canada), throughout the season. Area 3 (Elnora-Lousana district) in Stratum B was nearly doubled in size this year to off-set the need to abandon Area 4 (Big Valley) where an oil discovery resulted in too much human interference. This area was under continuous study by Messrs. Wayne H. Heuer, U. S. Fish and Wildlife Service and Jack Miller, Alberta Game Branch. Area 5 (Vermilion-Wainwright district) in Stratum B was under continuous study by Messrs. Harry Webster and Glen Smith of the Canadian Wildlife Service.

During July and August a banding crew operated throughout the Province in spite of serious handicaps caused by excessively wet weather. The banding crew was composed of Messrs. G. H. Jensen, Kenard Baer, James Birch, and James Kelly of the U. S. Fish and Wildlife Service and Dennis Weisser of the Alberta Game Branch.

The substantial increase in personnel and equipment allotted to the Alberta Surveys this year from the Dominion and Alberta Governments and Ducks Unlimited (Canada) have made possible a more successfully integrated program than has ever been possible before. A cooperative program has grown up for which the greatest appreciation is due both the private and governmental agencies involved as well as the individuals composing the various crews.

Survey Methods

As in 1952, breeding population and production indices were obtained solely by means of aerial surveys. Methods of observation were the same as outlined last year in Waterfowl Populations and Breeding Conditions Summer 1952, Special Scientific Report: Wildlife No. 21. Additional information as to coot population densities was added in 1953.

No changes were made in the number or location of the waterfowl transects in the various strata this year and all Alberta transects were surveyed by the same plane and crews. Stratum A, the prairies of southcentral Alberta, contains 13 parallel transects at 10-mile intervals extending from Alberta Highway No. 2 to the Saskatchewan border. Stratum B, the parklands, contains 10 parallel transects at 12-mile intervals also extending from Alberta Highway No. 2 to the Saskatchewan border, and Stratum C, the semi-arid prairies of the extreme south consists of 4 parallel transects at 18-mile intervals extending from the Rocky Mountains to the Saskatchewan border.

Weather and Water Conditions

During the past 7 consecutive years of cooperative waterfowl surveys in Alberta, there have been no 2 years in which the summer's weather picture has been comparable. This season has been one of the more unusual ones in all respects. After a warm, dry fall and winter in 1952-1953, the month of March was cold and stormy. The spring run-off was definitely poor with the dry soil absorbing all available moisture, leaving potholes and lakes at levels reminiscent of early July. Ice was not uncommon on some areas in higher elevations on the prairies when the first population survey was flown in May. "Sheet-water" was non-existent and many "C" areas on the prairies had already disappeared when the early migrants arrived. Alberta's moisture condition was only 88 percent of normal on April 30, 1953 as compared to 136 percent of normal on the same date in 1952. Every indication led one to believe that even with normal precipitation throughout the spring and summer, that the prairies would be in poor condition for waterfowl production.

Heavy, record breaking rains began to fall in May, continuing throughout June and July. The entire water picture changed so radically as to be unrecognizable when compared to May 1 conditions. In many areas of Stratum A and C, rainfall from April 30 to June 30 equalled or surpassed the average seasonal precipitation in the same area. Rainfalls of from 4 to 5 inches in a 24 hour period were not uncommon in several prairie areas. These downpours literally washed away the early duck nests, even though they might be located high enough above the water to escape rising water levels. By mid-July the general moisture conditions were 25 percent above normal and by August 20, 27 percent above normal.

Heavy rains in May and June in southern districts severely curtailed first nesting efforts there and reduced brood sizes of those broods which did hatch. Most parkland areas received their heavy rains somewhat later in the season, thus allowing for a more normal first hatch and a minor second one.

Because the May survey was made just prior to the time when the effects of the spring rains became apparent, the Provincial water picture showed an average figure of 16.35 ponds per square mile in May of 1953 as compared to 17.15 for May of 1952. Only Stratum C recorded a slight increase in water over the previous year. However, for the first time since these surveys have been made, the July water count on the prairies showed improvement over that made in May. See Table I.

Table I. - Water Areas on Aerial Transects, May and July, 1953

	Stratum A		Stratum B		Stratum C		Province	
	May	July	May	July	May	July	May	July
Total Ponds Seen	4,090	4,523	3,771	2,537	703	736	8,564	7,796
Ponds per Sq. Mi.	16.73	18.47	20.65	14.29	8.91	9.33	16.35	15.55
Estimated Total Ponds	369,532	407,965	538,965	372,969	143,558	150,035	1,051,305	999,865
Percent Change May to July		+ 10.4		- 30.9		+ 4.7		- 4.8

Breeding Population Trends - Aerial Data

For the third consecutive year a very appreciable increase in the breeding population of waterfowl has been recorded on our aerial transects in Alberta. The record population of 1952 was surpassed by slightly more than 10 percent.

In Table II below, a comparison of the waterfowl breeding populations of 1952 and 1953 has been made. The data contained therein is figured on the basis of total ducks actually observed, with populations by stratum and province derived as ducks per square mile.

In Table II I a waterfowl population index is established on the basis of the indicated population present. This data is derived from aerial observations which segregate the individual species into pairs, lone males and females, assuming each lone male or female to be mated. Thus these figures which represent pairs per square mile more closely approximates the true populations present than does Table II. The index figure thus established is still an index figure and should be treated as such, even though a more accurate one than that established in Table II.

Table II. - Aerial Waterfowl Population Data, 1951 to 1953 (Ducks Per Square Mile)

	Total Area Sq. Miles	Sample Sq. Mi.	Total Ducks Seen	Ducks Per Sq. Mi.	Population Index	Percent Change
Stratum A						
1951	22,088	516.0	12,115	23.47	518,405	
1952	22,088	481.4	13,316	27.45	606,316	+ 16.9
1953	22,088	489.7	15,332	31.31	691,575	+ 14.1
Stratum B						
1951	26,100	236.6	3,706	15.66	408,726	
1952	26,100	348.6	6,124	17.56	458,316	+ 12.1
1953	26,100	365.2	7,536	20.63	538,443	+ 17.5
Stratum C						
1951	16,112	228.2	2,382	10.43	168,048	
1952	16,112	165.2	2,714	16.43	264,720	+ 57.5
1953	16,112	157.7	3,056	19.37	312,089	+ 17.9
Province						
1951	64,300	980.8	18,203	17.03	1,095,179	
1952	64,300	995.2	22,154	20.67	1,329,352	+ 21.4
1953	64,300	1012.6	25,924	23.98	1,542,107	+ 15.1

Table III. - Aerial Waterfowl Population Data, 1952-1953

Indicated Population (Pairs Per Square Mile)

	Surface Area Sq. Miles	Sample Area Sq. Miles	Total Pairs	Pairs Per Sq. Mi.	Pop. Index in Pairs	Percent Change
Stratum A						
1952	22,088	481.4	10,962	22.77	502,942	
1953	22,088	489.7	11,653	23.79	525,493	+ 4.5
Stratum B						
1952	26,100	348.6	4,948	14.19	370,407	
1953	26,100	365.2	5,997	16.42	428,588	+ 15.7
Stratum C						
1952	16,112	165.2	2,205	13.35	215,079	
1953	16,112	157.7	2,424	15.37	247,640	+ 15.2
Province						
1952	64,300	980.8	18,115	16.94	1,088,428	
1953	64,300	1012.6	20,074	18.68	1,201,694	+ 10.4

Table IV. - Species Composition of Breeding Population - Aerial

Species	1952 Pairs Per Sq. Mile	1952 Percent of Tot. Pop.	1953 Pairs Per Sq. Mile	1953 Percent of Tot. Pop.
Mallard	5.2	31.0	7.0	37.6
Pintail	7.1	42.2	6.7	36.0
B-w. teal	0.6	3.0	0.5	2.7
G-w. teal	*	-	0.07	0.4
Gadwall	*	-	0.1	0.5
Baldpate	0.9	5.3	1.3	7.0
Shoveler	0.8	4.8	1.2	6.5
Redhead	*	-	0.3	1.6
Canvasback	*	-	0.3	1.6
Scaup	1.0	6.0	0.95	5.1
Ruddy	*	-	0.1	0.5
Bufflehead)	*	-	0.08	0.4
Goldeneye)	*	-	-	-
Cinn. teal	*	-	0.01	0.1
Misc. ducks	1.3	7.7	-	-
	16.9	100.0	18.6	100.0

* These species lumped together in 1952 as miscellaneous ducks.

Success of the Season - Aerial Data

The 1953 breeding season began with a population some 10 percent higher than the exceptional year of 1952. Water conditions, however, were not ideal at the start of the nesting season and though heavy precipitation occurred during the summer, its fall was so great on some occasions as to cause flooding and destruction of many early nests. This was true particularly in southern areas.

A cold spring in Stratum C, where ice and snow remained at higher elevations until after the May survey, and the cold weather in Stratum A delayed nesting from 10 days to two weeks on the prairies. Nest losses due to stubble plowing were rather high in Stratum C, while heavy late spring rains in Stratum A caused considerable nest loss. Observed broods in Stratum C showed 1.26 broods per square mile with a potential hatch of 1.59 broods per square mile. The total figure of 2.85 broods per square mile, though a 28 percent reduction over the 1952 figure is still above average for this semi-arid region. Observed brood densities in Stratum A were 3.12 broods per square mile, plus a potential later hatch of 1.35 broods or a total production of 4.47 broods per square mile. This is a 12.5 percent reduction over last year's production but again the 1952 figure was exceptional. Weather factors are undoubtedly responsible for the reduction in average brood size, 4.8 ducklings per brood in Stratum C and 5.5 per brood in Stratum A. Spotty observations in both of these strata indicated an appreciably larger brood size in the second hatch (approximately 7.0 ducklings per brood).

The greatest increase in breeding populations occurred in the parklands, Stratum B. Conditions were generally excellent throughout the nesting season, nest losses due to agricultural activity were relatively light and evidences of renesting were few and scattered. An observed brood density of 2.89 ducklings per brood was augmented by a potential later hatch of 0.41 broods per square mile or a total of 3.30 broods per square mile. This is a 29 percent increase over the 1952 production index. In keeping with the improved climatic conditions, the brood average in the parklands was 5.7 young per brood, the highest in the Province.

The provincial average brood size is recorded as 5.5 young per brood. The average brood density for the Province is 3.88 broods per square mile. Thus for all the vagaries of weather which have prevented a repetition of 1952's exceptional crop, the 1953 results are only 3.7 percent below the exceptional. In 1952, aerial observations indicated that it took 4.16 pairs of breeding ducks to produce 1 brood of young. This year, in spite of many adverse factors, it apparently took 4.79 pairs to produce one successful brood.

During the month of July, severe, widespread and frequent hailstorms of great destructive force swept many areas of the parklands and prairies. Careful and conservative aerial checks of the damage to adults and young, indicate a loss of about 3 percent of the index of production. Most of the hail losses on the prairies occurred after the July aerial surveys had been made and are not reflected in figures of production for Stratum A and C. One severe storm covering 700 square miles of Stratum B had occurred prior to the survey of that area and its effects are tallied in production figures for that stratum.

Table V. - Aerial Production Data, 1952 - 1953

	Stratum A		Stratum B		Stratum C		Province	
	1952	1953	1952	1953	1952	1953	1952	1953
Survey Area Square Miles	22,088	22,088	26,100	26,100	16,112	16,112	64,300	64,300
Sample Area Square Miles	240.7	244.85	174.3	177.575	82.57	78.85	497.57	501.275
Total Broods Seen	1,231	763	445	514	331	100	2,007	1,377
Total Broods Indicated	1,231	1,095	445	588	331	226	2,007	1,909
Broods Per Square Mile Indicated	5.11	4.47	2.55	3.30	4.00	2.85	4.03	3.88
Estimated Number of Broods Indicated	112,870	98,733	66,555	86,130	64,448	45,019	243,873	230,782
Average Brood Size	6.81	5.47	6.81	5.71	6.81	4.80	6.81	5.51
Estimated Number of Ducklings	768,645	540,070	453,240	491,812	438,891	220,411	1,660,776	1,252,293

Table VI. - Population and Production Comparisons, 1952-1953

	Population Per Sq. Mile		Percent	Broods Per Sq. Mile		Percent
	1952	1953	Change	1952	1953	Change
Stratum A	22.77	23.79	+ 4.5	5.11	4.47	-12.5
Stratum B	14.19	16.42	+15.7	2.55	3.30	+29.4
Stratum C	13.35	15.37	+15.2	4.00	2.85	-28.7
Province	16.94	18.68	+10.4	4.03	3.88	- 3.7

Summary

The 1953 waterfowl breeding population index was about 10 percent above that of the exceptional year of 1952. Poor water conditions in early spring, plus excessive rainfall and cool weather reduced the production of this population somewhat and resulted in an over-all decrease of 3.7 percent in the production of broods by comparison with the 1952 high. However, a sizeable reduction in average brood size from 6.81 to 5.51 ducklings per brood reduced the total production of young birds by 24.6 percent.

Banding

During July and August of 1953, it was possible to place a full-time banding crew into the field in Alberta. Their primary objective was to band juvenile waterfowl of all species and adults as well as juveniles of the less frequently banded species. It was originally planned to distribute the bandings equally throughout both the prairies and parklands. Heavy rains in July and August sharply curtailed travel possibilities in the parklands and reduced the percentage of bandings in that stratum somewhat. However, over 250 juveniles were banded by Messrs. Webster and Smith on the Vermilion study area and these are added to the bandings of the regular banding crew to give a total provincial figure.

Table VII. - Summary of Waterfowl Bandings in Alberta - 1953

	Adults			Juveniles			
Species	Male	Female	Unsexed	Male	Female	Unsexed	Total
Mallard	2	13	-	178	134	-	327
Pintail	6	7	-	72	72	-	157
B-w. teal	61	34	-	317	271	12	695
G-w. teal	20	7	-	4	4	-	35
Gadwall	-	-	-	25	30	-	55
Baldpate	19	9	-	222	163	-	414
Shoveler	-	2	-	89	86	-	177
Redhead	-	1	-	4	2	6	13
Canvasback	-	-	-	8	4	1	13
Scaup	-	1	-	51	40	2	94
Ringneck	1	-	-	1	1	8	11
Coot	-	-	1	-	-	48	49
Horned Grebe	-	-	-	-	-	2	2
Eared Grebe	-	-	-	-	-	3	3
Total	109	74	1	971	807	83	2,045

WATERFOWL BREEDING GROUND SURVEYS OF SPECIAL STUDY AREAS IN ALBERTA - 1953

Allen G. Smith

Introduction

The intensive ground study areas in Alberta were established with the following objectives in mind: (1) to determine the vegetative and other environmental characteristics of the waterfowl habitats in representative strata of the province; (2) to measure the effects of weather, fluctuating water levels, agricultural activities, and predation on waterfowl; (3) to determine the density of waterfowl breeding populations on sample areas in both parklands and prairies, and (4) to record the seasonal movements of this population as well as its nesting success and brood survival and the factors affecting them.

Description of the Areas

A general description of the study areas including their soil characteristics and vegetative aspects was presented on pages 110-111 of Waterfowl Populations and Breeding Conditions Summer 1952, Special Scientific Report: Wildlife No. 21 and will not be repeated here.

Methods and Personnel

It was felt to be advisable, for several reasons, to re-number the study areas and to re-locate one of them this year. As a result Area I, formerly the Suffield-Jenner Area, has now been located between Brooks and Suffield. This study was conducted by Mr. Fred Sharpe, Ducks Unlimited (Canada). Because of illness he was unable to make more than one breeding pair count. Work on Area II, the Strathmore study areas, was conducted by Mr. George Freeman, Ducks Unlimited (Canada). Weekly breeding pair and brood counts were made by him from April 25 through July 17. The Lousana-Elnora Study Area III was conducted by Messrs. Wayne Heuer, U. S. Fish and Wildlife Service and Jack Miller, Alberta Game Branch. These men were residing on the area and were able to make continuous observations here from May 4 to August 6. Area IV, the Vermilion study area was also under the continuous observations of Messrs. Harry Webster and Glen Smith, Canadian Wildlife Service. Aerial breeding pair and brood observations were made on all study areas by the writer. This same crew also took aerial photographs of all water areas in each study area during May. Aerial photographs were taken again in July when vegetation was at its height on Areas II and IV and portions of III. A defect in the aerial camera prevented the completion of this second photographic survey. However, the complete coverage in May was sufficient to serve our needs in mapping the physical characteristics of these habitats. Ground maps of the vegetation of Areas II, III and IV were made by the writer.

Observational methods used on the study areas followed the pattern set in 1952 except in the following cases. In order to establish a permanence and continuity to our water data from year to year, permanent bench marks were located in each pothole or lake for which water-level records are kept. On Area IV, Mr. Webster used a young Brittany Spaniel in locating broods and nests. As the dog was being trained in this work, his efficiency increased as the season progressed. A further change was made

in the size and location of each study area. Where observations had formerly been made in 1/8-mile strips on both sides of a highway, this year they were made only on one side. This modification in our methods aids in cutting down on the number of ducks that might be re-counted as they fly from one side of the road to the other and it also makes possible the lengthening of the study area, a decided advantage in sampling a larger district and in making aerial flights.

Weather and Water Conditions

The warm, dry fall and winter of 1952-1953, followed by a poor run-off this spring caused water levels generally throughout the province to be low by May 1. Exceptionally wet weather in June and July restored these levels and in the prairies caused marked improvement by August 1 over May 1 conditions. The later arrival of the rains to the parklands as well as generally warmer weather there, made for a more normal evaporation as shown by the data from Area IV. Pothole survival on Areas II and III showed only slight variation from conditions at the beginning of the survey. On Area IV, however, about 39 percent of the areas had dried up by August 1. This study area is in the northern parklands and compares favorably with the 1952 summer loss of 30 percent.

Table I. - Precipitation on Study Areas

Areas	May	June	July	Totals
I	2.20	6.80	1.80	10.80
II	1.70	5.90	2.60	10.20
III	1.49	5.12	5.46	12.07
IV	0.70	3.60	3.40	7.70

On Areas II, III and IV permanent bench marks were established and regular checks of water levels made. On Area II, 5 gauges on B areas showed an average loss for the season of 4.8 inches, while one gauge located on an A area recorded a sufficient rainfall throughout the season to offset the effects of evaporation and end the season with the same water depth as at the beginning of the study. On Area III, 5 gauges on A areas registered an average gain for the season of 1.9 inches, 9 gauges on B areas an average gain of 2.4 inches, and 6 gauges on C areas an average gain of 2.8 inches for the season. In Area IV where rainfall was not as great and where evaporation was greater than in other districts all types of areas showed losses through the season, 4 gauges on A areas showed an average loss of 4.4 inches, 10 gauges on B areas an average loss of 7.7 inches, and 6 gauges on C areas an average loss of 7.1 inches.

Table II. - Pothole Survival

Areas	May 1	June 1	July 1	August 1
1	62	No data	No data	No data
II	58	55	67	52
III	196	196	193	192
IV	204	189	123	124
Total	458	440	383	368

In Area IV where water levels were relatively normal, many "C" areas that had already dried up were temporarily filled again in late July but because of the lateness of the season no beneficial effects resulted.

Table III. - Classification of Ponds on Intensive Study Areas - Size

Areas	0-1 Acres	1-5 Acres	5-10 Acres	10-20 Acres	Total
I	45	10	7	-	62
II	52	6	-	-	58
III	161	32	2	1	196
IV	188	13	2	1	204

Table IV - Classification of Ponds on Intensive Study Areas - Type *

Areas	Type A	Type B	Type C	Total
I	3	2	57	62
II	7	21	30	58
III	24	46	126	196
IV	14	100	90	204

* Bach system of pothole classification.

Table V. - Total Acres by Type

Areas	Acres of "A"	Acres of "B"	Acres of "C"	Total
I	11	11	78	100
II	10	50	67	127
III	81	48	35	164
IV	51	71	37	159

Table VI. - Land-Water Relationship

Areas	Areas Per Sq. Mile	Acres of Water	Acres of Land	Ponds Per Sq. Mile
I	4.875	100	3,020	12.71
II	3.125	127	1,873	18.56
III	3.625	164	2,156	54.06
IV	6.375	159	3,921	32.00

Table VII. - Land Use

Areas	Grazing	Grain Crop	Hay Field or Nil	Bare Ground	Total
I	62	-	-	-	62
II	38	20	-	-	58
III	131	63	1	1	196
IV	119	35	50	-	204

Table VIII. - Density of Edge Types

Areas	Open *	Closed	Totals
I	62	-	62
II	58	-	58
III	122	74	196
IV	90	114	204

* 2/3 or more open shoreline.

Table IX. - Density of Emergent Vegetation

Areas	Open*	Closed	Total
II	46	12	58
III	46	150	196
IV	77	127	204

*2/3 or more open water.

The Breeding Population

Except on Area I, at least 5 separate counts of breeding birds were made through May and June. As may be seen in Tables X to XIII considerable variations occurred in individual species populations throughout these two months. In all cases, populations rose slightly in early June as renesting efforts began. Because of the delay of about 2 weeks in the nest season, the breeding population had not settled down until about mid-May. Thus, for purposes of making comparisons of populations the following figures are taken as the resident breeding pair population on each study area: Area I, taken on May 5, 42.7 pairs per square mile; Area II, taken on May 29, 100.2 pairs per square mile; Area III, taken on May 26, 98.8 pairs per square mile; and Area IV, taken on May 19, 78.5 pairs per square mile. In the case of Areas II, III and IV, the arrival of the blue-winged teal marked the stabilization of the breeding population.

Breeding Populations - All Study Areas

Table X. - Area I - 4.875 Square Miles

Date	Total Ducks	Pairs	Lone Males	Lone Females	Ind. Pop.	Ducks / sq. mi.	Pairs / sq. mi.	Ind. Pop. / sq. mi.
May 6	306	98	110	-	416	62.8	42.7	85.3

Table XI. - Area II - 3.125 Square Miles

Date	Total Ducks	Pairs	Lone Males	Lone Females	Ind. Pop.	Ducks / sq. mi.	Pairs / sq. mi.	Ind. Pop. / Sq. mile
5/9	355	125	105	-	460	113.6	73.6	147.2
5/15	321	98	125	-	446	102.7	71.4	142.7
5/29	423	110	203	-	626	135.4	100.2	200.3
6/5	433	114	205	-	638	138.6	102.1	204.2
6/15	328	76	176	-	506	105.0	80.6	161.9

Table XII. - Area III, - 3.625 Square Miles

Date	Total Ducks	Pairs	Lone Males	Lone Females	Ind. Pop.	Ducks / Sq. Mi.	Pairs / Sq. Mi.	Ind. Pop. / Sq. Mi.
5/11	358	122	104	10	472	98.8	65.1	130.2
5/18	398	138	113	9	520	109.8	71.7	143.4
5/26	578	220	125	13	716	159.4	98.8	197.5
6/4	410	144	114	8	532	113.1	73.4	146.8
6/10	498	154	180	10	688	137.4	94.9	189.8

Table XIII. - Area IV - 6.375 Square Miles

Date	Total Ducks	Pairs	Lone Males	Lone Females	Ind. Pop.	Ducks / Sq. Mi.	Pairs / Sq. Mi.	Ind. Pop. / Sq. Mi.
5/11-14	694	264	151	15	860	108.9	67.5	134.9
5/19-21	797	296	192	13	1,002	125.0	78.6	157.2
5/25-26	668	234	180	20	868	104.8	68.1	136.2
5/30 - 6/4	690	225	219	21	930	108.2	72.9	145.9
6/8-9	657	200	217	40	914	103.1	71.7	143.4

Species Composition of Breeding Population - All Study Areas

Table XIV. - Area I (May 6)

Species	Total Pairs	Pairs Per Sq. Mile
Mallard	41	8.4
Pintail	128	26.3
Gadwall	1	0.2
Baldpate	10	2.1
Blue-winged teal	4	0.8
Shoveler	23	4.7
Redhead	1	0.2
Total	208	42.7

Table XV. - Area II -- 3.125 Square Miles

Species	May 9 Tot. Prs.	May 9 Pairs Sq. Mi.	May 15 Tot. Prs.	May 15 Pairs Sq. Mi.	May 29 Tot. Prs.	May 29 Pairs Sq. Mi.	June 5 Tot. Prs.	June 5 Pairs Sq. Mi.	June 15 Tot. Prs.	June 15 Pairs Sq. Mi.
Mallard	51	16.3	44	14.1	61	19.5	58	18.6	58	18.6
Pintail	104	33.3	98	31.4	136	43.5	118	37.8	69	22.1
Gadwall	4	1.3	4	1.3	5	1.6	11	3.5	9	2.9
Baldpate	18	5.8	21	6.7	21	6.7	21	6.7	18	5.8
G-w. Teal	2	0.6	1	0.3	2	0.6	2	0.6	9	2.9
B-w. Teal	17	5.4	17	5.4	34	10.9	43	13.8	35	11.2
Shoveler	19	6.1	27	8.6	23	7.4	29	9.3	17	5.4
Redhead	-	-	-	-	-	-	1	0.3	-	-
Canvasback	3	1.0	1	0.3	2	0.6	5	1.6	5	1.6
Scaup	12	3.8	10	3.2	25	8.0	31	9.9	32	10.2
Ruddy duck	-	-	-	-	4	1.3	-	-	-	-
Total	230	73.6	223	71.4	313	100.2	319	102.1	252	80.6

Table XVI. - Area III -- 3.625 Square Miles

Species	May 11 Tot. Prs.	May 11 Pairs Sq. Mi.	May 18 Tot. Prs.	May 18 Pairs Sq. Mi.	May 26 Tot. Prs.	May 26 Pairs Sq. Mi.	June 4 Tot. Prs.	June 4 Pairs Sq. Mi.	June 10 Tot. Prs.	June 10 Pairs Sq. Mi.
Mallard	100	27.6	95	26.2	103	28.4	83	22.9	98	27.0
Pintail	18	5.0	15	4.1	25	6.9	9	2.5	10	2.8
Gadwall	5	1.4	2	0.6	11	3.0	8	2.2	6	1.7
Baldpate	20	5.5	17	4.7	26	7.2	21	5.8	21	5.8
G-w. Teal	8	2.2	14	3.8	12	3.3	11	3.0	14	3.9
B-w. Teal	33	9.1	56	15.4	95	26.2	76	21.0	88	24.3
Shoveler	2	0.6	3	0.8	1	0.3	4	1.1	3	0.8
Redhead	3	0.8	6	1.7	6	1.7	6	1.7	7	1.9
Canvasback	19	5.2	23	6.3	10	2.8	7	1.9	16	4.4
Scaup	24	6.6	22	6.1	52	14.3	29	8.0	61	16.8
Goldeneye	1	0.3	-	-	-	-	-	-	-	-
Bufflehead	-	-	5	1.4	5	1.4	6	1.6	4	1.1
Ruddy duck	-	-	2	0.6	10	2.7	4	1.1	9	2.5
Scoter	3	0.8	-	-	2	0.6	2	0.6	7	1.9
Total	236	65.1	260	71.7	358	98.8	266	73.4	344	94.9

Table XVII. - Area IV -- 6.375 Square Miles

Species	May 11-14		May 19-21		May 25-26		May 30-June 4		June 8 - 9	
	Tot. Prs.	Pairs Sq. Mi.	Tot. Prs.	Pairs Sq. Mi.	Tot. Prs.	Pairs Sq. Mi.	Tot. Prs.	Pairs Sq. Mi.	Tot. Prs.	Pairs Sq. Mi.
Mallard	191	29.9	213	33.4	168	26.4	203	31.8	167	26.2
Pintail	35	5.5	54	8.5	56	8.8	46	7.2	48	7.5
Gadwall	9	1.4	9	1.4	13	2.0	19	3.0	17	2.7
Baldpate	47	7.4	50	7.8	45	7.0	35	5.5	46	7.2
G-w. Teal	24	3.8	29	4.5	31	4.9	30	4.7	20	3.1
B-w. Teal	42	6.6	55	8.6	40	6.3	68	10.7	59	9.3
Shoveler	16	2.5	16	2.5	15	2.3	17	2.7	18	2.8
Redhead	5	0.8	6	0.9	3	0.5	3	0.5	19	3.0
Canvasback	21	3.3	11	1.7	9	1.4	1	0.2	4	0.6
Scaup	24	3.7	42	6.6	38	6.0	30	4.7	49	7.7
Ringneck	-	-	-	-	-	-	2	0.3	-	-
Bufflehead	2	0.3	5	0.8	4	0.6	2	0.3	1	0.2
Ruddy duck	10	1.6	11	1.7	12	1.9	6	0.9	7	1.1
Scoter	-	-	-	-	-	-	3	0.5	2	0.3
Unidentified	4	0.6	-	-	-	-	-	-	-	-
Total	430	67.4	501	78.5	434	68.1	465	72.9	457	71.7
Coot	65		56		53		42		37	

Nesting

Fifty-seven duck nests were located on Area III, where all efforts to locate nesting birds were made by two men beating out the surrounding cover without the use of a dog. Twenty-one coot nests were also located on this area.

Table XVIII. - Nesting Data - Area III

Species	Nests Located	Average Clutch	Destroyed	Successful	Percent Success
Mallard	13	6.4	9	4	30.8
Pintail	3	9.3	0	3	100.0
Blue-winged teal	11	9.5	10	1	10.0
Green-winged teal	1	11.0	0	1	100.0
Gadwall	2	10.5	2	0	00.0
Redhead	1	4.0	1	0	00.0
Canvasback	6	7.1	1	5	83.8
Scaup	12	9.1	4	8	66.6
Ruddy	6	5.6	2	4	66.6
Canada Goose	2	5.0	1	1	50.0
Total	57	7.8	30	27	47.4
Coot	21	8.0	3	18	85.7

Eighty duck nests and twenty-eight coot nests were located on Area IV. During the latter part of the season the crew received the assistance of a young Brittany Spaniel which was being trained for this type of work.

Table XIX. - Nesting Data - Area IV

Species	Nests Located	Average Clutch	Destroyed	Successful	Percent Success
Mallard	50	8.3	36	14	28.0
Pintail	4	8.0	2	2	50.0
Blue-winged teal	4	5.0	3	1	25.0
Green-winged teal	2	9.0	2	0	00.0
Gadwall	1	11.0	0	1	100.0
Canvasback	2	6.5	2	0	00.0
Scaup	8	8.1	3	5	62.5
Ruddy	8	5.3	5	3	37.5
Unidentified	1	5.0	0	1	100.0
Total	80	6.9	53	27	33.7
Coot	28	8.3	1	27	96.4

Of the thirty nests destroyed on Area III, 9 (30.0 percent) were taken by crows and magpies, 7 (23.3 percent) were attributed to mammalian predators, 12 (40.0 percent) were destroyed by unknown causes and 2 (6.6 percent) by road construction. On Area IV, 26 (49.1 percent) were destroyed by crows and magpies, 9 (16.9 percent) by mammalian predators, 14 (26.4 percent) by unknown causes, 2 (3.8 percent) by cattle, 1 (1.9 percent) by hail and 1 (1.9 percent) by humans.

Production

Brood counts were made at periods of from 10 days to two weeks apart on Areas III and IV after June 15. No brood counts were made on Area I due to the illness of the observer. On Area II brood counts were made until July 17 at which time the observer terminated his study in order to begin a banding program.

Table XX. - Brood Counts - Area II

Species	June 1	July 6	July 17	Total Production*
Mallard	1	4	1	5
Pintail	5	17	9	20
Baldpate	-	4	4	8
Blue-winged teal	-	-	4	4
Shoveler	-	6	1	7
Canvasback	-	1	1	2
Total	6	32	20	46

* Total production equals brood count of July 6 plus Class I A broods of July 17.

With a breeding population of 313 pairs and only 46 broods available on July 17, a mere 14.7 percent of the breeding pairs succeeded in bringing off broods. However, if it had been possible for this area to be checked as closely as Areas III and IV and for as long a time, this figure would undoubtedly have been considerably higher.

Table XXI. - Brood Counts - Area III

Species	June 1	July 1	August 1	Total Production
Mallard	2	5	12	15
Pintail	-	1	2	3
Baldpate	-	1	11	11
Gadwall	-	-	6	6
Blue-winged teal	-	1	44	44
Green-winged teal	-	1	3	4
Shoveler	-	-	2	2
Redhead	-	-	3	3
Canvasback	-	1	8	8
Scaup	-	-	16	16
Ruddy	-	-	13	13
Bufflehead	-	-	1	1
Unidentified	-	2	-	-
Total	2	12	121	126
Coot	-	-	37	37

Total production on this area was computed by adding broods seen on August 1 to those seen on June 1 as well as those Class II or III broods seen on July 1 and considered able to fly by August 1. The breeding population was considered to be 358 pairs. A brood count of 126 broods represents a pair success of 35.2 percent which compares not too favorably with the nest success of 47.4 percent.

Table XXII. - Brood Counts - Area IV

Species	June 1	July 1	August 1	Total Production
Mallard	4	18	20	32
Pintail	-	4	3	7
Baldpate	-	6	10	10
Gadwall	-	-	2	2
B-w. Teal	-	1	18	18
G-w. Teal	-	2	5	5
Shoveler	-	-	2	2
Unidentified	-	-	5	5
Redhead	-	-	2	2
Canvasback	-	1	5	5
Scaup	-	-	4	4
Ruddy duck	-	-	7	7
Bufflehead	-	-	2	2
Ringneck	-	-	1	1
Total	4	32	86	102
Coot	-	-	25	25

Total production on this area also was computed by adding June 1 broods to those observed on August 1 plus Class III and advanced Class II broods of the July count which were considered able to fly by August 1.

With a breeding population of 501 pairs and a production of 102 broods we have a pair-brood success of only 20.4 percent as compared to a nesting success of 33.7 percent.

Brood Averages by Age Classes

Table XXIII. - Area III

Species	IA	IB	IIA	IIB	III	All	No. Broods *
Mallard	6.1	5.5	5.4	4.0	4.6	5.2	33
Pintail	6.0	4.0	8.0	-	4.3	5.0	7
Baldpate	7.5	7.2	9.0	8.0	-	7.6	17
B-w. Teal	8.0	8.5	6.9	-	8.0	7.8	74
Scaup	10.5	8.0	6.0	-	-	7.7	21
Ruddy duck	6.4	4.8	-	-	-	5.7	13

Table XXIV - Area IV

Species	IA	IB	IIA	IIB	III	All	No. Broods *
Mallard	8.0	7.8	5.6	7.1	3.5	6.4	43
Pintail	-	-	7.0	6.1	5.6	6.1	15
Baldpate	7.8	9.2	7.4	10.0	-	8.4	19
B-w. Teal	7.8	7.6	9.5	9.4	-	8.5	15
Canvasback	7.3	8.2	3.6	8.0	-	6.8	12

* Includes repeat observations on some broods at different age periods.

Table XX V. - Comparison of Ground and Aerial Pair Counts

Species	Area I		Percent	Area II		Percent	Area III		Percent	Area IV		Percent
	Ground	Air	Seen in Air	Ground	Air	Seen in Air	Ground	Air	Seen in Air	Ground	Air	Seen in Air
Mallard	41	30	73.2	61	34	55.7	103	25	24.3	168	49	29.2
Pintail	128	76	59.4	136	51	37.5	25	9	36.0	56	11	19.6
Gadwall	1	-	-	5	2	40.0	11	6	54.5	13	1	7.7
Baldpate	10	5	50.0	21	1	4.8	26	3	11.5	45	2	4.4
B-w. Teal	4	1	25.0	34	1	2.9	95	8	8.4	40	-	-
G-w. Teal	-	-	-	2	-	-	12	1	8.3	31	1	3.2
Shoveler	23	10	43.5	23	9	39.1	1	1	100.0	15	1	6.6
Canvasback	-	1	-	2	4	200.0	10	5	50.0	9	2	22.2
Redhead	1	-	-	-	-	-	6	-	-	3	-	-
Scaup	-	-	-	25	10	40.0	52	15	28.8	38	9	23.7
Ruddy duck	-	-	-	4	-	-	10	2	20.0	12	2	16.6
Bufflehead	-	-	-	-	-	-	5	-	-	4	1	25.0
Scoter	-	-	-	-	-	-	2	-	-	-	-	-
Unidentified	-	67	-	-	21	-	-	34	-	-	15	-
Total	208	190	91.3	313	133	42.5	358	109	30.4	434	94	21.7
Coot	-	-	-	-	-	-	66	5	7.6	53	8	15.0

Adjusted for unidentified ducks.

In Area II I, Class III broods average 6.5 ducklings. If total production was 126 broods then 819 young were reared to maturity by 358 pairs. Thus the original population of 716 ducks increased to 1535 or 114 percent.

Because of the paucity of data on Class III broods on Area IV, Class IIB brood data is used to estimate production. If 501 pairs produced 102 broods whose over-all average size at the IIB age class is 7.9, then 806 ducklings were raised nearly to maturity from 102 broods. This population added to the original 1,002 adults give us 1,808 ducks or an increase of 80 percent over the breeding population.

Expressed in another way, it took about 3 pairs of breeding ducks to produce a successful brood in Area III, 5 pairs to produce a successful brood in Area IV. In each area a serious predator problem exists as far as nesting is concerned. In the Lousana district, 53 percent of all nests destroyed could be attributed to avian and mammalian predators, in the Vermilion district, 66 percent of the nest destruction was from the same cause.

Aerial versus Ground Coverage of Breeding Population

An aerial census of breeding pairs was flown on each study area in May. Attempts were made to coordinate the two methods so that counts made by both aerial and ground crews would occur close to each other in time.

On Area I, the bald prairie, where edge and emergent cover is either non-existent or comparatively sparse, 91.3 percent of the waterfowl population was observed from the air. On Area II, a mixed prairie and cultivated district where emergent and edge cover is moderate in density, 42.5 percent of the population was observed from the air. On Area III, a parkland district where 38 percent of all areas are considered to have "closed" edge types, 30.4 percent of the waterfowl were observed from the air.

In Area IV, 21.7 percent of the population was recorded from the air. On this study area 56 percent of the ponds contained "closed" edge types.

Table XX V I. - Comparison of Ground and Air Brood Counts

	Ground	Air	Percent Seen by Air
Area II	20	12	60.0
Area III	74	30	40.5
Area IV	58	16	27.6

During the brood count an additional factor enters into aerial observations, the density of emergent cover. At the time of the brood count 21 percent of the ponds on Area II were covered by emergents, 77 percent of the ponds on Area III and 62 percent of the ponds on Area IV were considered "closed" by emergents.

Summary

1. Water conditions were relatively poor on all areas at the beginning of the season. Heavy rains in June and July restored levels on the prairies and southern parklands and held those in the northern parklands to near normal.

2. Breeding populations varied from 42.7 pairs to the square mile on Area I (open prairie), 100.2 on Area II (mixed prairie), 98.8 on Area III (open parkland) to 78.6 in Area IV (heavy parkland). Density of water areas varied also from 12.71 ponds per square mile on the open prairie to the heaviest density of 54.06 on Area III where the most dense population was also recorded.

3. Species composition of the areas differs as their vegetative types differ. In order of importance, the four most important species in each study area are listed as follows: Area I; pintail, mallard, shoveler, and widgeon; Area II; pintail, mallard, blue-winged teal and scaup; Area III; mallard, blue-winged teal, scaup and widgeon; Area IV; mallard, pintail, widgeon and blue-winged teal.

4. Nesting data indicates a success of 47.4 percent on Area III, and 33.7 percent on Area IV. Avian and mammalian predators accounted for 53 percent on Area III and 66 percent on Area IV.

5. Brood success was generally low on all areas, 15 percent on Area I I, 35 percent on Area III, and 20 percent on Area IV.

6. Aerial observations of study areas in four vegetative types indicate that 91 percent of the breeding population was seen by the aerial observer on the bald, open prairie, 42.5 percent of the breeding population and 60 percent of the broods on the mixed prairie, 30 percent of the breeding pairs and 40 percent of the broods on the open parklands, and 22 percent of the pairs and 27.6 percent of the broods in the heavy parklands.

WATERFOWL BREEDING GROUND SURVEY IN SASKATCHEWAN

J. J. Lynch and J. B. Gollop

The success of the annual waterfowl hatch in Saskatchewan has important bearing on our continental supply of game ducks. Over half of the famous "Prairie Nesting Grounds" (true Grasslands and Parklands) of Canada is located in this Province. It might be said that Saskatchewan is the most important single geographical unit of waterfowl producing habitat in North America. The southern part of the Province is particularly important for its production of pintails, mallards, and other choice species.

Our survey area in southern Saskatchewan (south of Latitude 54° N) is 114,000 square miles in extent, larger than the combined land area of all the New England States plus the State of Illinois. There is much variation in the waterfowl producing potential of various parts of this vast region, and individual areas vary greatly in productivity from year to year. It is therefore necessary to cover the entire region in order to get a complete picture of the success of each waterfowl nesting season. Adequate coverage is possible only by means of aircraft. Two aerial surveys are run each year, in order to appraise Province-wide nesting prospects. Ground observations are also carried on at strategic locations, in order to gather detailed information that cannot be gotten from the air.

Three U. S. Fish and Wildlife Service aircraft (Piper PA-18's) took part in the 1953 aerial surveys of the Prairie and Parkland regions of Saskatchewan. Pilot Ross Hanson of the U. S. Fish and Wildlife Service and William Hyska of the Saskatchewan Game Branch, twice flew 3,900 linear miles of air-transects in Sub-stratum "A" West and Strata "B" and "C". May coverage of these transects was accomplished in 71 air-hours, while a second and in some cases a third coverage in July required 80 hours of flying time. Pilots Noltemeier of the U. S. Fish and Wildlife Service, and D. G. Colls of the Canadian Wildlife Service, flew the 1,200 miles of transects in southeastern Saskatchewan (Sub-stratum "A" East), logging approximately 20 air-hours in May and again in July. Pilots Lynch and Conover of the U. S. Fish and Wildlife Service put in 50 air-hours in May, and 80 air-hours in July, on special air-ground comparison studies, water surveys, type-mapping, photo missions, banding surveys, and cross-country brood counts. In addition, Lynch and Pilot Charles Evans of the U. S. Fish and Wildlife Service logged 20 hours in Saskatchewan in early August, completing special studies and making final coverages of rearing areas for late broods, Thus nearly 350 air-hours, covering a linear distance of over 30,000 miles were devoted to these surveys. Northern Saskatchewan, covered by Pilot Edward Wellein of the U. S. Fish and Wildlife Service, is reported on elsewhere in this publication.

Waterfowl "Crop-Forecasting"

The information from these surveys is needed by administrators in setting up hunting regulations. The Canadian Wildlife Service draws upon the information available by June 1 each year in order to establish the season's hunting regulations in Canada. The U. S. Fish and Wildlife Service can utilize all survey data gathered prior to August 1 in recommending hunting regulations for the United States.

The waterfowl nesting and rearing season is seldom finished by these deadlines. In a year such as 1953, when the entire nesting season is late, the season's total hatch may not have materialized fully until the latter part of September.

We therefore do not attempt, in these air surveys, to measure the actual total number of waterfowl produced each season. Instead, we measure the breeding population and the various factors that will influence the nesting success of that population as the season progresses. On the basis of this "Measure of Production Prospects", we issue, on June 1 and again on August 1, a Forecast which reflects the degree of success or failure of the eventual season's hatch. In a sense, this procedure is somewhat analagous to agricultural crop forecasting, in that we consider our nesting population to represent "seed", and the various other measurements to represent "growing conditions","maturity", "yield", and others. Each item considered in these forecasts is presented graphically on the attached charts.

Early-Season Prospects

Saskatchewan enjoyed periods of warm, open weather during late April and early May. We anticipated that a substantial carry-over of breeding ducks from last year's exceptional hatch would be available at the start of this 1953 nesting season. However, surface water conditions were somewhat precarious at this time. There was enough water in the potholes this spring, even in the drought-susceptible Grasslands, to attract nesting ducks. But soil-moisture reserves also were encouraging to farmers, and we feared that early-season plowing of stubble-fields might disrupt the first-nesting attempt of pintails and mallards. These birds nest in great numbers in wheat stubble, because of early-season scarcity of natural nesting cover in the intensively-farmed wheat country.

The May, 1953 Breeding Population ("Seed-Stock")

Our hopes for a substantial breeding population were quickly realized. Our May, 1953 air surveys showed a breeding population of 40.2 ducks per square mile (20.1 pairs per square mile) for southern Saskatchewan. This represented a breeding population index of almost 5 million ducks on our survey area. This "Population Index" is a minimal figure, since air survey teams miss some ducks. This May, 1953 population exceeded the large 1952 population of 38.9 ducks per square mile, and the latter, by the way, had been the highest May population we had recorded for Saskatchewan since 1947.

The mallard showed a strong increase this year (up 27 percent from last year), while the pintail, which spearheaded last year's big increase over former years, was down only 3 percent from 1952. All of the later-nesting surface ducks, particularly blue-winged teal, were down from last year, but present populations still compared favorably with long-term averages. It may be that unseasonably cold weather during the first half of May delayed arrival of these species, and resulted in a low count on air-transects flown prior to May 15. Some divers, notably the canvasback and redhead, were up from last year.

Surface Water ("Growing Conditions")

In addition to recording ducks on our air-transects, we record the number of ponds and other water areas within the transect strips. This figure reflects the

abundance of surface water, a factor that has definite bearing on the success of the "duck crop".

The May 1953 air surveys showed 32.6 ponds per square mile. This figure is the highest we have ever recorded for Saskatchewan. It represents a considerable improvement over the 1952 water index figure of 20.3 ponds per square mile, and 1952 was considered to be a wet year.

Although surface water conditions had been somewhat dubious at the start of this season, May of 1953 proved to be a cold month, with much snow prior to the 15th, and repeated rains thereafter. Cold weather and overcast skies kept evaporation down to a minimum, and melting snow bolstered the surface water supply. Rains during the latter part of the month quickly brought surface water supply up to normal, and in many cases above normal.

Melting of snow during the period of air surveys created many "puddles" of a temporary nature. These served to inflate our aerial pond counts somewhat, but real and durable improvement in the Parklands (Sub-stratum "A" - East and Stratum "B"), where ponds are small but very numerous, is the main reason for this year's increase in the number of ponds per square mile.

The general water outlook at the end of May was most encouraging. Ponds in the Grasslands now had enough water to assure rearing of broods from the first-nesting attempt, while the potholes of the Parklands promised to last until broods from later nestings were on the wing.

Progress of First-Nesting ("Germination")

As the nesting season progresses, females start incubation, leaving single drakes and small groups of drakes on our transect strips. The proportion of these "lone drakes" to birds that are still paired during the May survey period reflects the timing of the hatch. We also use this information to predict whether the first nests of pintails and mallards are approaching successful outcome.

This year, only 44 percent of the waterfowl recorded on our May surveys were lone drakes, and flocking of post-nesting drakes was not advanced. This indicates that the 1953 nesting season was much later than that of last year. The pintail, always our earliest nester, was more advanced in its first-nesting effort (64 percent lone drakes) than was the mallard (57 percent lone drakes).

Early in May, this first-nesting attempt seemed destined to be lost to the plow. However, the snow and very cold weather of May 11 to 15, and the periodic rains that followed, delayed farming operations. As of the end of May, seeding and plowing for summerfallow were only 60 to 70 percent complete this year in Saskatchewan, as against 90 to 100 percent complete at the corresponding period last year.

Burning of stubble was much in evidence this spring, both because of delay in summerfallowing, and because the heavy stubble from last year's excellent growing conditions interfered with plowing. Some early nests may have been lost in these fires.

The hard freeze and drifting snow that occurred just prior to the middle of May seemed to be a real threat to the 1953 waterfowl hatch. Temperatures dropped to 18° in parts of southern Saskatchewan during this time, and snow drifted to depths of 3 feet or more in some localities. Undoubtedly some duck nests were buried by snowdrifts, and frozen eggs were found. Had this loss been serious enough to disrupt the first nesting attempt, hens that lost nests should have reappeared on our transects, and the percentage of lone drakes should have dropped. Careful comparison of transects run before and after the freeze was made, and we noted some slight tendency for hens to reappear after May 15. But this change was not so great as to suggest any widespread disruption of the first-nesting attempt by cold weather alone.

June 1 Forecast

"Prospects as of June 1 indicate that Saskatchewan will turn out a good duck crop in 1953. There is a chance that this crop may be exceptional."

"Our breeding population is the highest we have recorded since 1947. This population is favored by adequate surface water, and water conditions are improving steadily as the season progresses. The big question now is whether the first clutches of stubblefield-nesting pintails and mallards will hatch before being caught by the plow. If these nests hatch, the 1953 duck crop will be exceptional. If they are destroyed, the 1953 crop might still be substantial provided a strong and immediate renesting takes place."

"We are not too much concerned at this time over possible loss of nests during the mid-May freeze. Considering the timing of the nesting season, any hens that lose nests during this period would probably re-nest. Furthermore, this cold weather has delayed plowing operations as much as a week or ten days in some localities, and in the long run may save more nests than it has destroyed."

"This 1953 crop will be later than the 1952 hatch, and will have greater "spread" in maturity. Even if it proves to be smaller than that of last year, it may be more "shootable". Late-maturing broods will migrate later in the fall, and thus be available to U. S. hunters during the open season. Last year's early-maturing pintail crop migrated so early that it escaped hunting pressure in the northern part of the United States."

July Broods (Present "Stand" of Crop)

Broods visible at the time of our July 1953 air surveys amounted to 1.6 per square mile. This was far below last year's aerial count of 4.37 broods per square mile. However, the high 1952 brood count was due in large part to overwhelming success of a very early first-nesting attempt of pintails and mallards. In view of the lateness of the 1953 hatch, our present aerial figure of 1.6 broods per square mile was not discouraging.

A look at the species of broods was enlightening. The pintail, which made up 29 percent of our May breeding population, produced only 19 percent of the broods and a mere 10 percent of "Potential Later Broods" recorded on the July surveys. It is obvious that the first-nesting of this species was not nearly so successful as last year, and its subsequent re-nesting effort has not been outstanding. Without

an exceptional crop of pintails, Saskatchewan cannot hope for an exceptional duck crop. While the mid-May snows and subsequent rains held up plowing operations, apparently this delay was not quite long enough to allow stubblefield nests to hatch, especially in the better-drained undulating and gently-rolling Grasslands. In fact the delay was probably tragic, for when plowing finally did start in earnest, it seems to have caught pintail nests that were far along in incubation, and almost ready to hatch. Hens that lose their nests this late in incubation are not inclined to re-nest.

The mallard made a much better showing of early broods, accounting for 50 percent of all broods seen during our July surveys. Furthermore a strong and persistent late nesting of mallards was evident (see Potential Later Broods). Apparently those first nests of mallards that had been destroyed by plowing, predators, and cold weather were lost in the egg-laying or early-incubation stages, and hens promptly renested. The other species of surface ducks seemed to be doing at least as well as last year, while the 1953 hatch of divers, particularly the scaup and canvasback, showed definite improvement.

Potential Later Broods (Late Crop or Recovery)

Adult single drakes, lone hens, and paired birds encountered on our July transects are recorded as birds that are still trying to nest. We use this "Potential Later Broods" figure as a measure of prospects for a late hatch. It tells us whether a late-nesting effort is taking place, and whether this effort is strong or weak. It also tells us whether the potential late hatch represents a second-nesting attempt of pintails and mallards that have lost earlier nests, or whether it stems from species such as teal, baldpate, etc. that normally are late-season nesters. Such information is vital in a year like 1953, when the whole nesting effort was late, and a tremendous breeding population had only indifferent success in the first nesting attempt but did not entirely lose its great reproductive potential in the process.

Our July 1953 figure of 2.64 "Potential Later Broods" per square mile indicated that a good late hatch could be expected. The mallard seemed to be making a strong renesting effort, contributing 35 percent of the "late Breeders" in our records. The pintail, on the other hand, made only a fair second attempt (10 percent of "Potential Later Broods"), despite the great numbers of pintails in our May breeding population and the indifferent success of their first nesting.

The other species that normally are late nesters made up the balance of our "potential Later Broods" figure, indicating that the hatch of these species would be at least as good as last year, but would mature 2 to 3 weeks later than usual. Among the divers, the scaup and canvasback showed promise of a good late hatch in addition to their successful early nesting.

July Ponds ("Late-Season Growing Conditions)

The eventual success of the 1953 waterfowl crop in Saskatchewan now very obviously hinged upon the outcome of the late nesting effort. The supply of surface water during the water-critical months of July and August would be a most important factor in deciding this outcome.

Fortunately the rains that started in May continued all summer. General soaking rains were frequent, and occasional downpours from massive air-mass thundersqualls and frontal squall-lines dumped 4 to 7 inches on some localities within a 24-hour period. Our July aerial surveys turned in a very high count of 22.37 July ponds per square mile. These rains were adequate to maintain water levels in the potholes and rearing ponds all summer.

In some localities that were flooded by torrential rains, we feared that nests of divers and other near-water nesters might be flooded out. However such loss, if it occurred, seems not to have been of serious consequence to the Provincial Duck Crop. Mallard and pintail nests are rarely affected by flooding in Saskatchewan, because these are usually located in well-drained undulating or gently-rolling stubblefields and pastures, and along fence-rows and road-grades.

NOTE: Temporary rain puddles caused some inflation in our July aerial pond count. Since the top number of true waterfowl rearing ponds in July is less than 20 per square mile, we have sealed down the forecast vale of any higher figure on our Forecast Chart. In the comparative data, the July 1951 pond figure is now reported as 11.4 ponds per square mile. Last year we adjusted this figure (obtained from 1/8-mile transects) so as to be more nearly comparable with May figures from 1/4-mile transects. It was decided this year to let July figures rest on their own merits, with no attempt being made to determine seasonal water loss from May.

Brood-Size ("Yield")

Saskatchewan broods had fewer ducklings this year than usual. The nearly-mature (Class III) broods recorded on our regular July air-transects averages only 5.6 ducklings each. Independent cross-country brood counts by Conover, Thompson, and Lynch verified this, showing 5.8 ducklings per Class III brood.

These smaller broods probably reflect the preponderance of second-nestings in this season's hatch, although there is evidence that some first-clutches partially survived the plow and hatched 3 to 5 ducklings. Last year's high figure of over 7 ducklings per Class III brood stemmed from the great success of large first-clutches of pintail and mallard. We recorded a few "Flying Class III" mallard and pintail broods this year with 7 to 9 ducklings, but the great clouds of large flying broods that were so conspicuous in Saskatchewan in July, 1952 were absent this year.

Brood Maturity

Last year's successful first-nesting gave us 3.8 Class II and III broods per square mile, indicating a large and early-maturing Duck Crop. This year Saskatchewan shows only 1.1 nearly-mature brood per square mile. The latter figure was 69 percent of all broods seen in the July 1953 survey, but many later broods have since materialized. Subsequent observations showed that the mallard, which had some broods on the wing by mid-July, was still turning out downy Class I's the first week in August. This is additional evidence of the mallard's strong late nesting effort. Most broods of the later nesting species were half-grown (Class II) by the time we completed our air work in Saskatchewan on August 9.

The "spread" we predicted in maturity of the 1953 waterfowl crop had certainly become a reality. Some broods hatched so late in the season that there was some danger of their being caught by freezing weather before they reached the flying stage.

Non-Productive Hens

Hens that are in moult, or that join up with pre-moult flocks of drakes prior to mid-July, probably have lost their nests or broods, and can be considered non-productive for the season. Our banding crews ordinarily would keep records of the number of non-productive hens in the early moult. This year, however, our banding effort was concentrated on young ducks, rather than adult moulters, and therefore the 1953 banding records contain very little information on this subject.

We therefore tried aerial sampling of pre-moult flocks of adults, recording hens-vs-drakes on a "Dictaphone". We found a high (30-40 percent) ratio of hens to drakes in some flocks of pintails, and a much smaller proportion of hens in pre-moult flocks of mallards. This bears out our conclusion that the pintail lost out on its first-nesting and failed to make a strong re-nesting effort. However, we feel that our sampling was tried a week or ten days too late, for pre-moult flocks of adults had reached unwieldy proportions (200 to 500 birds per flock) when our counts were made. A count made the last week in June, when flocks run 20-50 birds each, would have given us more reliable data.

Forecast, August 1

"The 1953 Waterfowl Crop for Southern Saskatchewan will be substantial (forecast rating 184 out of a possible 300). But the failure of the first-nesting of the pintail will prevent this year's crop from being exceptional."

"While this 1953 crop is not so great as last year's phenomenal hatch, it has great spread in maturity, and should be more 'shootable'. The mallard will be the most abundant and most available duck this fall. However, some mallards will be scarcely mature by the time the hunting season opens in Canada, and there may be some very late migrants to the United States."

"The pintail will fall far short of its fall, 1952 population, but the pintails we do have may be more available to U. S. hunters. The great, early-maturing pintail hatch of last year apparently migrated too early to give our northern States much pintail shooting. We are having a fair late hatch of pintails this year, not large, but still twice as good as last year, and these late-maturing pintails will not be ready to move south until seasons are open in the United States."

"All other species of surface ducks are enjoying the same strong nesting success as last year, and some divers, especially canvasback and scaup, are having an extra-good season."

"Improvement in the southeastern Parklands (Sub-stratum "A" - East) of Saskatchewan has been pronounced this year, and we expect the Mississippi Flyway to benefit from a late but substantial hatch of mallards and other surface ducks from this region."

Table I. - Computation of May 1953 Breeding Population and Number of Ponds, Southern Saskatchewan

Stratum	Area in Sq. Mi.	Sample In Sq. Mi. (1953)	Total Ducks seen on Transects	% Lone Drakes	Adjusted Ducks Per Sq. Mi.	Population Index 1953	1952 Population & Ducks Per Sq. Mi.	1953 Ponds Index & Ponds per Sq. Mi.	1952 Ponds
"A"-East (Parklands)	14,600	292.0	4,481 ID* 1,351 Ux	42.5	28.47	415,662	402,668 (27.58)	508,080 (34.8)	296,380 (20.3)
"A"-West (Grasslands)	37,630	623.5	8,774 ID 5,107 Ux	43.68	47.16	1,774,630	1,830,699 (48.65)	974,617 (25.9)	726,259 (19.3)
"B" (Parklands)	50,520	325.0	3,817 ID 3,778 Ux	46.3	34.5	1,742,940	1,828,318 (36.19)	2,041,008 (40.4)	1,156,908 (22.9)
"C" (Short-grass)	11,290	127.0	1,551 ID 1,648 Ux	48.7	57.79	652,449	381,376 (33.78)	203,220 (18.0)	126,448 (11.2)
PROVINCE	114,040	1,367.5			40.2	4,585,681 (Total Ducks)	4,387,685 (38.5)	3,726,925 (32.68)	2,305,995 (20.3)

Note: "ID" - Identified Ducks
"Ux" - Unidentified Ducks.

CHART 1. - 1952 WATERFOWL CROP OUTLOOK - Southern Saskatchewan (as of June 1, 1953)

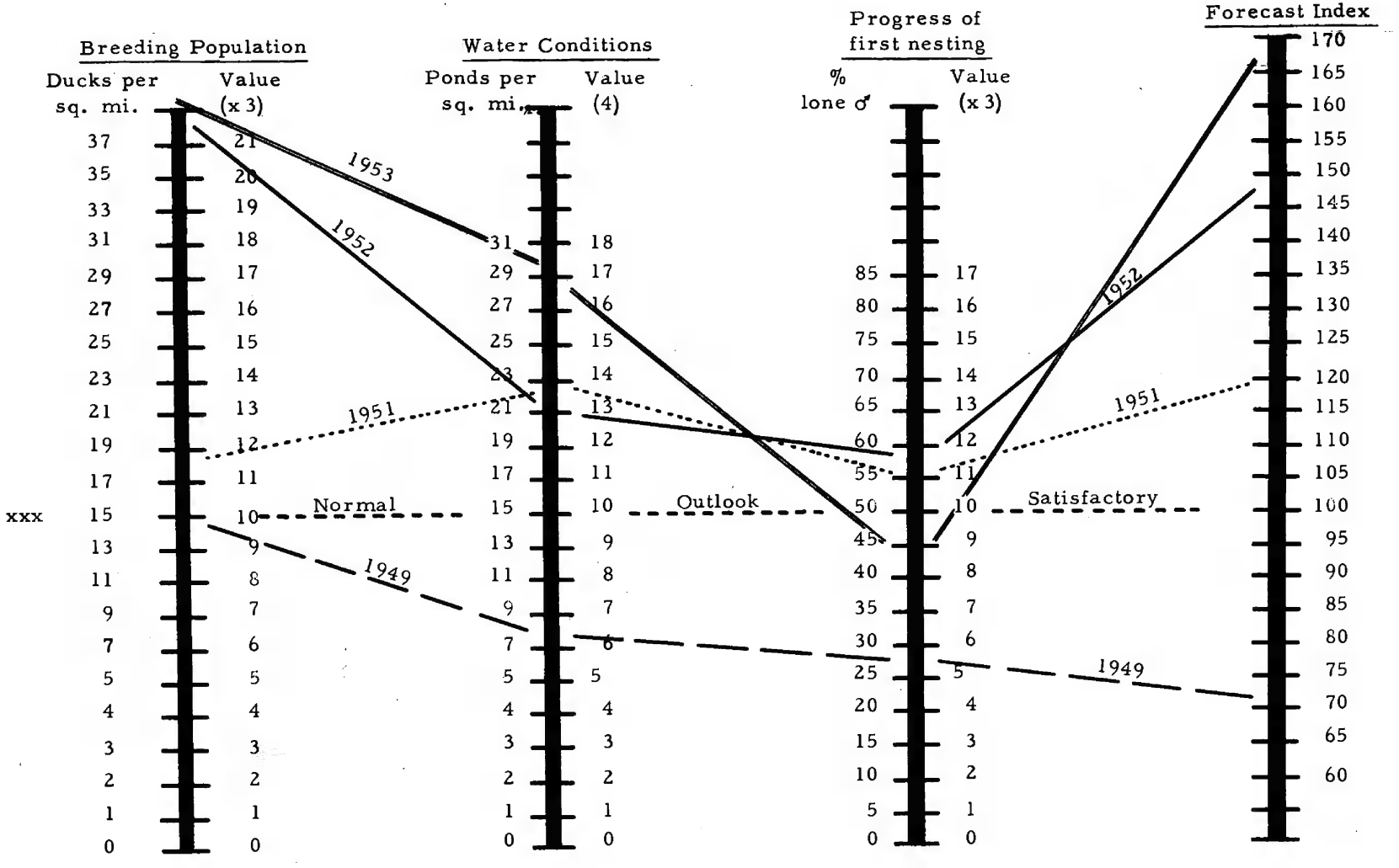
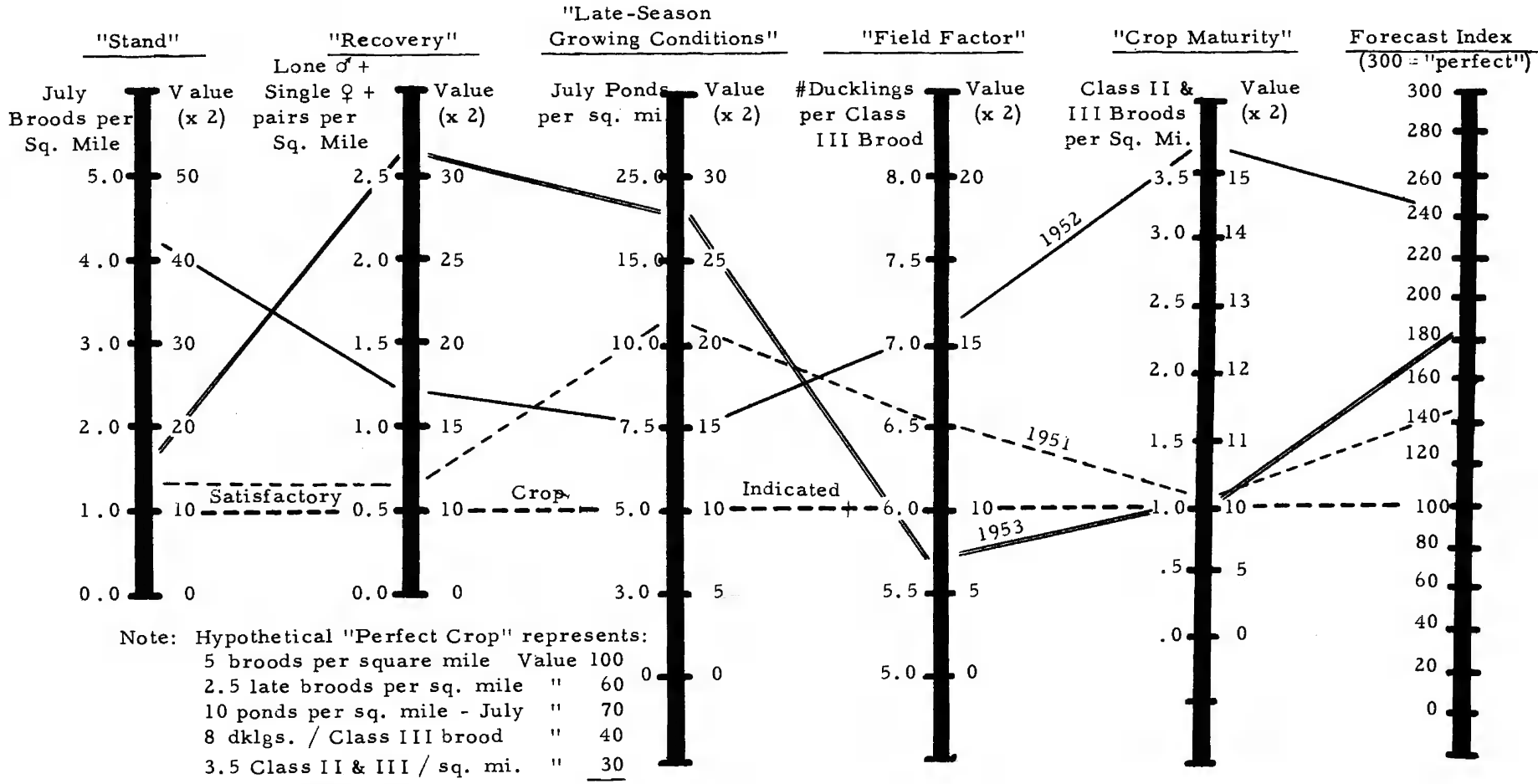


CHART 2. - Waterfowl Crop Forecast for Southern Saskatchewan as of August 1, 1953



Note: Hypothetical "Perfect Crop" represents:

5 broods per square mile	Value	100
2.5 late broods per sq. mile	"	60
10 ponds per sq. mile - July	"	70
8 dklgs. / Class III brood	"	40
3.5 Class II & III / sq. mi.	"	30
Total		300

Adult-Juvenile equiv: 1:3

Table II. - Summary of Air Transect Data, Saskatchewan, July 1953

Stratum	Size in Square Miles	Sample in Square Miles	Broods seen on transect	Brds. per Sq. Mile	Total Broods	P.L.B.* seen	P.L.B.* per Sq. mi.	P.L.B.* Index	Ponds seen on transect	Ponds per Sq, Mi.	Ponds Index
"A"-East (SE Parklands)	14,600	146.0	82	0.56	8,180	846	5.8	84,680	7,499	51.3	748,980
"A"-West (Grasslands)	37,630	313.5	388	1.24	46,650	1,030	3.25	122,300	6,770	21.6	812,810
"B" (Parklands)	50,520	162.5	345	2.12	107,120	240	1.48	74,570	2,872	17.6	889,150
"C" (Shortgrass)	11,290	63.5	122	1.92	21,690	190	1.72	19,420	570	8.9	100,480
PROVINCE	114,040	685.5		1.61	183,640		2.64	300,970		22.37	2,551,420

Saskatchewan Comparisons:	1950	1951	1952	1953
No. Broods per square mile	0.9	1.34	4.37	1.61
No. Potential Later Broods per Square mile		0.7	1.2	2.64
No. Ponds per Square Mile	5.7	11.4	7.5	22.37
Average Class III Brood		6.5	7.1	5.6
Class II & III Broods per Square Mile		1.2	3.8	1.1

*P.L.B. = Potential Later Broods. Determined by recording the number of pairs, lone drakes, and lone hens still on transect during the July survey.

Table III. - Indices to Total Broods and Potential Later Broods* in Southern Saskatchewan** as Determined by Aerial Survey

Species	1951 Index		1952 Index		1953 Index		Percent Change from	
	Broods	P.L.B.*	Broods	P.L.B.*	Broods	P.L.B.*	1951	1952
Mallard	-	-	155,510	44,030	92,130	107,890		- 40
Pintail			272,160	13,510	36,250	32,870		- 87
B-w. Teal			17,500	18,470	7,890	35,380		- 55
G-w. Teal			800	1,860	0	3,460		-100
Gadwall			7,580	12,450	8,120	14,840		+ 20
Baldpate			10,520	18,000	8,850	21,080		- 16
Shoveler			32,380	11,670	18,550	13,390		- 42
Black Duck			0	0	0	0		
Total Puddlers	(Species of Broods not Recorded, 1951 Aerial Survey)		496,450	119,990	171,790	228,910		- 63
Redhead			420	3,220	0	7,970		-100
Canvasback			6,840	830	7,220	15,660		+ 6
Scaup			1,530	8,700	3,870	28,450		+150
Ringneck			420	0	0	2,990		-100
Ruddy duck			3,150	7,130	750	14,020		- 75
Scoter			390	0	0	2,540		
Goldeneye			0	920	0	0		
Bufflehead			0	0	0	450		
Total Divers			12,750	20,800	11,840	72,080		- 8
Total Ducks	170,800	85,130	509,200	140,790	183,630	300,990	+ 7	- 64
Coot	2,550	16,950	28,775	84,230	8,380	53,480	+69	- 71

* P.L.B. (Potential Later Broods) is determined by recording the number of pairs, lone drakes, and lone hens still on transect during the July survey.

** Square Miles in the area sampled - 114,040; total square miles surveyed in 1953 - 685.5

Table IV. - Indices to Total Breeding Pairs of Waterfowl in Southern Saskatchewan as Determined by Aerial Surveys*

Species	Average Index 1949 to 1952	Percent of Lone Drakes 1952 Index		Percent of Lone Drakes 1953 Index		Percent Change From Average	Percent Change From 1952
Mallard	496,074	768,103	75.0	979,136	57.0	+ 97	+ 27
Pintail	393,438	687,150	82.0	667,521	64.0	+ 69	- 3
B-w. Teal	85,530	132,705	13.0	66,722	7.0	- 28	- 98
G-w. Teal	11,404	13,975	19.0	10,616	7.0	- 7	- 31
Gadwall	39,904	54,689	11.0	38,456	7.0	- 3	- 40
Baldpate	91,232	132,570	27.0	92,340	12.0	+ 1	- 33
Shoveler	91,232	170,087	36.0	127,555	17.0	+ 39	- 33
Total Puddlers	1,208,814	1,959,279		1,982,346		+ 64	+ 2
Redhead	11,404	18,303	23.0	42,398	13.0	+271	+131
Canvasback	39,914	81,448	57.0	126,581	34.0	+219	+ 55
Scaup	62,722	114,900	20.0	104,387	8.0	+ 68	- 9
Ringneck	5,702	1,610		200			
Ruddy duck	11,404	18,435		8,734			
Goldeneye	5,702	6,399		310			
Bufflehead	5,702	2,742		4,357			
Scoter	22,808	21,026		23,530			
Total Divers	165,358	264,863		310,495		+ 87	+ 17
Total Ducks	1,374,172	2,215,142	57.6	2,292,841	44.0	+ 67	+ 3
Coot	66,143	69,948		151,733		+129	+118

* Square Miles in Area Sampled - 114,040; Total Square Miles Surveyed - 1,376.5

Table V. - Indices to Water Conditions in Southern Saskatchewan During July as Determined by Aerial Survey

Average Index 1950 to 1952	1952 Index	1953 Index	Percent Change From 1951	1952
2,280,690	2,305,995 (20.3 per square mile)	3,726,925 (32.7 per square mile)	+ 63	+ 61

Table VI. - Indices to Water Conditions in Southern Saskatchewan During July as Determined by Aerial Surveys

1951 Index	1952 Index	1953 Index	Percent Change From 1951	1952
1,416,243 (11.4 per square mile)	855,071 (7.5 per square mile)	2,551,420 (22.4 per square mile)	+ 80	+198

WATERFOWL BREEDING GROUND SURVEY OF REDVERS AREA, SASKATCHEWAN

Jerome H. Stoudt

Raymond J. Buller

The Redvers study area was established in 1952 in the aspen parklands habitat type of southeastern Saskatchewan with the following objectives in mind:

1. Determine accuracy with which the contribution of ducks from specific study areas to the fall flight can be forecast on June 15 and August 1.

2. To obtain information on habitat requirements of breeding ducks and the effect of water, climatic conditions, predation, and habitat on the production and survival of young.

Weather and Water Conditions

The preceding fall and winter of 1952-53 was exceptionally dry with a decided lack of both rain and snow. Roads were open all winter. Although the winter was very mild, the spring break-up was continually being frustrated by cold spells so that nesting was delayed and the mallards and pintails did not begin nesting until the last week in April. Temperatures rose rapidly on May 4 and 5 and during this period a large segment of the mallard population were either laying or incubating egg clutches. This increased tempo in nesting was apparent in the field at the time and borne out later by hatching data.

During the nesting and brooding season the weather was wet, cold and miserable for the most part. This unseasonable weather extended from May 9 through the first part of July. During the last half of July and the first part of August the weather cleared and abundant rainfall ceased. We have always heard of the dire effects of wet, cold weather on newly hatched ducklings but such ill effects were not noted during the 1953 brooding season.

Water levels on May 1, 1953 were from 6 to 8 inches lower than in May 1952 due to a lack of precipitation during the preceding fall and winter, however, abundant precipitation in June of 1953 soon brought the water above 1952 levels.

An average of 15 water gauges set out on May 1 showed the following fluctuations thereafter:

			Fluctuation in Inches					
May 11	May 21	May 31	June 10	June 20	June 30	July 10	July 20	July 30
- 0.23	- 1.22	- 0.27	+ 3.10	+ 2.13	+ 3.73	+ 2.40	- 0.57	- 3.43

Certain water areas in the vicinity of Redvers, Saskatchewan actually raised to a point from 8 to 9 inches above May 1 levels during late June which brought them up to and above May 1952 levels. Water levels during both June and July were considerably ably above those in 1952 and all forms of aquatic and upland vegetative cover was exceedingly tall and rank, much more so than in 1952.

The number of water areas remaining on the study area during 1953 breeding season was as follows:

Table I. - Change in Number of Water Areas during the 1953 Breeding Season

	May 11 - 13	June 1 - 4	July 11 - 17	August 2 - 6
Total number of areas	306	306	306	306
Number of areas containing water	306	306	276	214
Percent of areas containing water	100	100	90	70
Total number of open areas * with water	154	154	150	126
Percent of open areas still containing water	100	100	97	82
Total number of wooded areas * with water	152	152	126	88
Percent of areas still containing water	100	100	73	53

*Wooded water areas are those areas which have two-thirds or more of the shoreline bordered by willows or aspen trees. Most of the wooded areas have close to 100 percent of the shoreline in willow or aspen. For the most part the shoreline on the open areas contain little or no brush.

The Breeding Population

Two censuses of breeding pairs were taken. The first was made on May 11, 12 and 13, and the second on June 1, 2, 3 and 4. Results are as follows:

Table II. - Breeding Pair Census -- Redvers Study Area

	Males		Pairs		Total Pairs Males plus Pairs		*Estimated Population
Species	May	June	May	June	May	June	Total Pairs
Mallard	151	129	107	77	258	206	258
B-w. teal	4	74	88	76	92	150	150
Pintail	31	38	24	14	55	52	55
Baldpate	1	6	25	25	26	31	31
G-w. teal	1	18	19	16	20	34	34
Canvasback	12	14	12	9	24	23	24
Shoveler	1	6	12	7	13	13	13
Scaup	0	1	12	8	12	9	12
Gadwall	0	0	2	6	2	6	6
Redhead	0	1	2	3	2	4	4
Ring-necked duck	0	0	4	1	4	1	4
Ruddy duck	0	0	1	0	1	0	1
Total	201	287	308	242	509	529	592

* Estimated total population was arrived at by adding the total number of pairs of mallards, pintail, Canvasback, scaup and ring-necked ducks from the May census to total pairs of all the other species from the June census. This calculation was necessary because not all of the late migrating species had arrived at the time of the May census while by June 1 some of the mallards and pintail ducks had apparently left the area enroute to moulting areas.

REDVERS STUDY AREA TRANSECT AND ADJOINING AREA

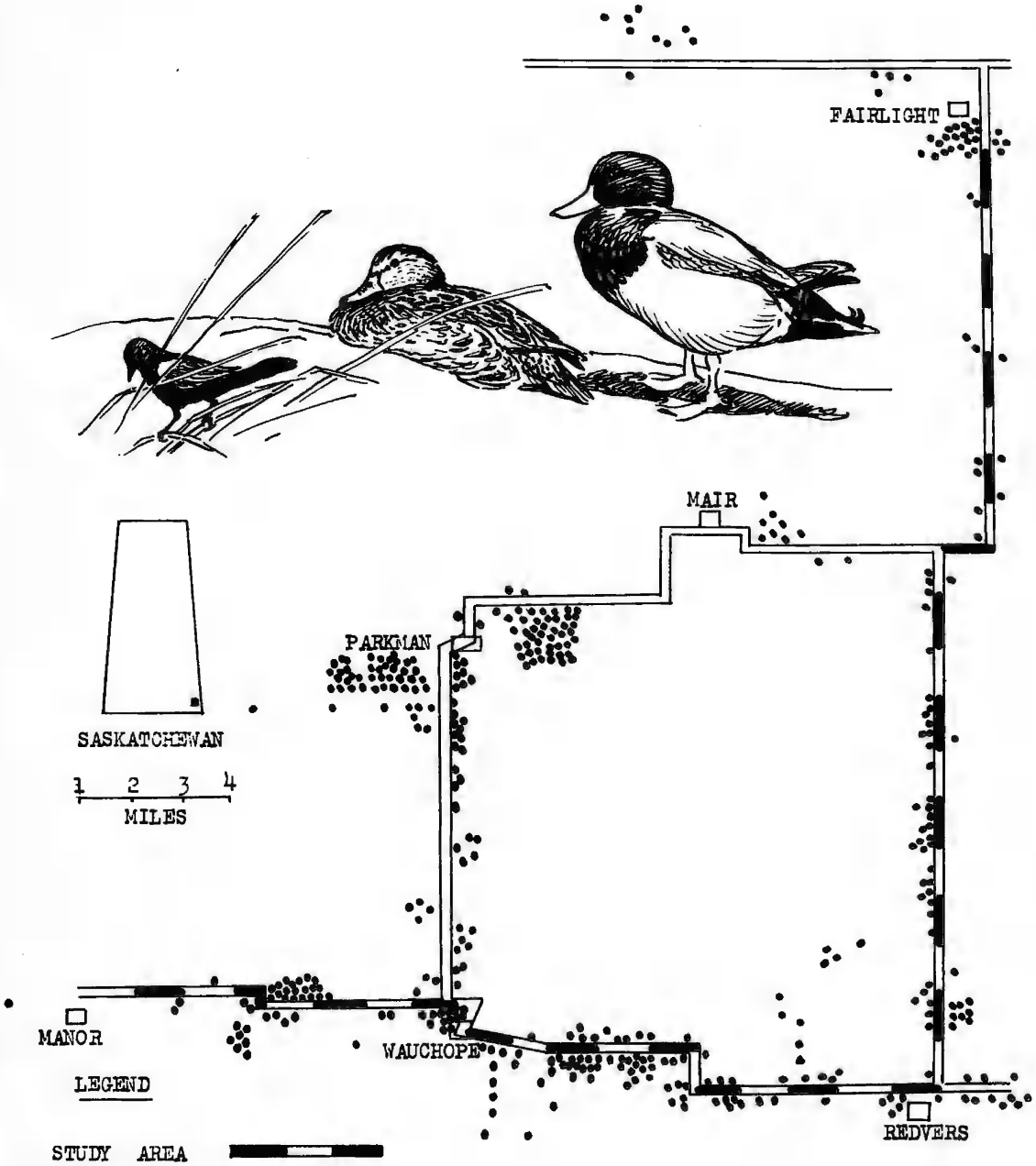


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Table III illustrates the 1953 population of total pairs and species composition as compared to that of 1952. Total pairs represents pairs plus lone drakes so that if the total population of ducks on the area is desired, the population figures in this table should be multiplied by two.

Table III. - Population and Species Composition

Species	Total Pairs		Percent Species Composition	
	1952	1953	1952	1953
Mallard	265	258	44.1	43.6
Blue-winged teal	142	150	23.6	25.3
Pintail	64	55	10.6	9.3
Baldpate	32	31	5.3	5.2
Green-winged teal	32	34	5.3	5.7
Canvasback	23	24	3.8	4.0
Shoveler	12	13	2.0	2.2
Scaup	15	12	2.5	2.0
Gadwall	7	6	1.2	1.0
Redhead	4	4	0.7	0.7
Ring-necked duck	4	4	0.7	0.7
Ruddy duck	1	1	0.2	0.2
Total	601	592	100.0	100.0

The population for the two years was so nearly the same for all species that it tends to confirm the theory advanced in our 1952 report that the Redvers Area was supporting a population of ducks which was very near, if not at, maximum carrying capacity.

As in 1952 the number of pairs per acre was slightly greater on wooded areas (3.15 pairs per acre) as compared with 2.85 pairs per acre on open areas. However, inasmuch as the wooded areas averaged only 0.37 acres in size as compared to 0.95 acres for the open areas this preference for wooded areas is not significant as the density per acre is higher on the smaller sized areas.

Nesting Success

During the 3 months study period, 456 nests were located. Locations of most nests in relation to the study area are shown on the accompanying map. Some nests were found too far from the study area to allow inclusion on the map but none were over 20 miles from the study area. Twenty-five percent of the nests were found by the black Labrador dog.

Table IV includes nest history data for both active and inactive nests, the former being those from which a hen was flushed and then the nest followed through to completion. Inactive nests, or those completed when found were not a very reliable source of data in 1953 due to the abundant, rank cover which appeared about the time of hatching so that "hatched when found" nests were extremely hard to find.

Table IV. - Nest Data Summary -- Redvers Study Area

Species	Summary of all Nests Found by Species: Total Found	Abandoned*	Total Left	Destroyed	Hatched	Percent Success	Active Nests Only: Destroyed	Hatched	Percent Success
Mallard	311	21	290	162	128	44.1	112	107	48.9
B-w. teal	60	6	54	35	19	35.2	29	17	37.0
Pintail	24	2	22	9	13	59.1	9	13	59.1
Canvasback	26	1	25	7	18	72.0	7	17	70.8
Baldpate	8	3	5	4	1	20.0	3	1	25.0
Lesser scaup	7	0	7	3	4	57.1	3	4	57.1
G-w. teal	5	2	3	1	2	66.7	1	2	66.7
Ringneck	5	-	5	2	3	60.0	2	3	60.0
Redhead	4	-	4	3	1	25.0	3	1	25.0
Shoveler	4	-	4	1	3	75.0	0	3	100.0
Gadwall	2	0	2	0	2	100.0	0	2	100.0
Total	456	35	421	227	194	46.1	169	171	50.1

* The abandoned nests in the second column have not been used in calculating nesting success because these were the cases where we were sure that abandonment had been caused by finding the nest and frightening the hen so as to cause desertion.

The worst offender causing nest destruction was the crow which accounted for 43 percent of all nests lost. Skunks took 24 percent, ground squirrels 12 percent, 5 percent more plowed, 4 percent unknown, and the remaining 11 percent were destroyed by fox, coyote, flooding, burning, badger and desertion. Two mallards, two baldpates, and three blue-winged teals were killed on the nest by predators. Only active nests were used in calculating nest losses from predators.

Table V. - Mallard Nesting Success for Cover Types

Cover Type	1952		1953	
	No. of Nests	Success Percent	No. of Nests	Success Percent
Snowberry in Field or Pasture	40	35.0	111	36.0
All Grassy Cover Types	47	55.3	88	47.7
Carex and Cattail Around Ponds	2	100.0	48	50.0
Willow and Aspen Reproduction	11	64.0	21	66.7
Mixed Brush	-	-	9	44.0
Mixed Weeds and Grasses	27	40.7	9	22.2
Stubble Fields	-	-	4	50.0
Total for all cover types	127	47.2	290	44.1

Assuming that the 47 percent was average success in 1952 and 44 percent in 1953 then we note that both snowberry (Symphoricorpos racemosa) and mixed weeds and grasses were below average both years while all other cover types yielded better than average success both years. The "mixed weeds and grass type" was found mostly in old abandoned fields where cover was abundant and rank but predators were also very prevalent, including skunks, Franklin's ground squirrels and crows. Snowberry patches are also heavily used by skunks, badger and Franklin's ground squirrels both for dens and for foraging.

Eighty two or 28 percent of all nests found were along the roadside, between the road and fields or pastures. Nesting success in this habitat averaged 47.6 percent or 8 percent better than average.

Brood Production

Due to the abundance of precipitation and resulting tall exceedingly rank cover, broods were very difficult to observe during June and the forepart of July. In addition, there were numerous shallow water-filled depressions and wet spots in fields and pastures where hens could take their broods and remain undetected. This led to the erroneous impression by some observers that the 1953 brood crop was below par and not at all in proportion to the breeding pair population. However, our nesting data indicated a successful hatch and by the end of July this was borne out by a bumper crop of nearly all species of ducks indigenous to the area.

The brood census in 1953 was conducted exactly ten days later than in 1952 due to the delayed hatch this year. Two censuses were taken in July 11 through 17, and August 2 through 6 respectively. From these two counts the calculated total brood production is shown in Table VI.

Table VI. - Redvers Study Area -- Brood Production

Species	Method I			Method II		
	All Broods Observed on July Census	Class I Broods from August Census	Total Est. Brood Production	Class III Broods from July Census	August Broods except flying	Total Est. Brood Production
Mallard	76	25	101	27	72	99
Blue-winged teal	33	30	63	2	68	70
Pintail	20	-	20	13	3	16
Baldpate	12	6	18	-	16	16
Green-winged teal	2	4	6	-	9	9
Canvasback	19	-	19	3	19	22
Shoveler	5	1	6	-	9	9
Lesser scaup	2	6	8	-	7	7
Gadwall	-	2	2	-	2	2
Redhead	1	1	2	-	2	2
Ringnecked duck	1	-	1	-	1	1
Ruddy duck	-	-	0	-	-	-
Total	171	75	246	45	208	253

Table VII. - Pair-Brood Data -- Redvers Study Area

Species	Breeding Pair Census				Brood Census		Production
	Pairs in May	Pairs Remaining in Aug.	Breeding Population	Percent Species Comp.	Brood Production	Percent Species Comp.	Percent of Successful Females
Mallard	258	3	255	44.3	101	41.1	39.1
Blue-winged teal	150	2	148	25.7	63	25.6	42.0
Pintail	55	1	54	9.4	20	8.1	37.0
Baldpate	31	4	27	4.7	18	7.3	66.7
Green-winged teal	34	3	31	5.4	6	2.4	19.3
Canvasback	24	2	22	3.8	19	7.7	86.4
Shoveler	13	1	12	2.1	6	2.4	50.0
Lesser scaup	12	0	12	2.1	8	3.2	66.7
Gadwall	6	0	6	1.1	2	0.8	33.3
Redhead	4	0	4	0.7	2	0.8	50.0
Ringnecked duck	4	1	3	0.5	1	0.4	33.3
Ruddy duck	1	0	1	0.2	0	0	0
Total	592	17	575	100.0	246	100.0	42.8

Inasmuch as the two censuses were taken three weeks apart (21 days) it was assured that on August 2-6 all Class IA, IB and IC broods had hatched since the July 11-17 count; or that Class IIIA, and IIIB broods from the July count were flying by the time the August count was taken. Either method of calculating total production gave approximately the same total but Method I is believed to be the most reliable in most instances. The 246 broods produced in 1953 is almost exactly the same as the 1952 production of 249 broods.

From Tables II and VI we can now approximate the success of the breeding pairs or in other words the percent of successful females as shown in Table VII.

It is extremely interesting to note that the over-all percent of successful females for 1953 was 42.8 compared to 42.4 for 1952. Mallard success dropped from 46.2 percent to 39.1 percent but broods of this species are the hardest of all to census due to their extreme wariness and their propensity for taking to cover at the slightest provocation and running for several hundred yards to other water areas. Increased cover and more abundant water in 1953 may have caused some broods to be missed so that the drop in success from 46 to 39 percent may not be an actual one. A black labrador dog was used again in 1953 and it was agreed that in this habitat type a dog is essential if anywhere near a total count of broods is desired. The phenomenal success of the canvasback was evident from both nesting and brood data, and broods were much in evidence throughout the southeastern corner of Saskatchewan.

Brood Averages

Table VIII illustrates brood averages for 1952 and 1953, broods were recorded by 7 age classes in 1953 but for purposes of comparison, only the conventional age groups will be used. Brood averages were based on data collected either on the study area or in the general area surrounding. Class III broods were larger in 1953 for all species although there was no significant difference in Class O brood size nor in nest clutch sizes. Vastly improved cover conditions in 1953 could have reduced juvenile loss and caused the difference in size of Class III broods.

Aerial VS Ground Coverage

Several aerial censuses of the Redvers Study Area were flown to count both breeding pairs and broods. Flying was done in a Piper Super Cub 125 plane by Pilot-Biologist John Lynch and observer V. C. Conover.

Data in Table IX is taken from ground counts made on May 11-17 and June 1-6, a combination of which was used to arrive at total breeding population. The "adjusted" total for each species equals lone drakes and pairs actually counted plus a hen added for each lone drake. This was done for both aerial and ground coverage. Aerial counts gave adjusted totals on the following dates:

May 12	May 16	May 17	May 21	May 24
346	376	384	400	428

An average of May 21 and 24 was used to compare with the calculated total breeding population.

Table VIII. - Brood Averages - Age Classes

Species	Class O*		Class I		Class II		Class III		All	
	1952	1953	1952	1953	1952	1953	1952	1953	1952	1953
Mallard	6.96	6.91	6.16	6.59	6.57	7.04	6.13	6.55	6.42	6.74
B-w. teal	8.87	8.50	7.97	8.15	7.34	8.24	7.25	7.98	7.94	8.21
Pintail	6.40	7.12	5.25	5.71	6.50	6.00	5.00	5.19	5.62	5.82
Baldpate	8.40	7.68	7.13	7.19	7.83	6.54	7.00	7.15	7.81	7.23
Canvasback	7.25	6.42	6.25	6.67	6.09	6.80	5.64	6.07	6.28	6.53

* Class O is made up of broods one week or less in age.

Table X. - Aerial VS Ground Brood Counts -- Redvers Study Area

Species	Total Number of Broods Inner 1/16-Mile			Observed at Peak of Brooding Season - Outer 1/16-Mile		
	Ground *	Air	Percent Seen from Air	Ground *	Air *	Percent Seen from Air
Mallard	47	6	13	39	5	13
Blue-winged teal	43	7	16	26	5	19
Pintail	2	1	33	4	0	0
Baldpate	10	0	0	6	0	0
Green-winged teal	5	0	0	4	0	0
Canvasback	13	1	8	6	1	17
Lesser scaup	4	0	0	3	0	0
Shoveler	7	0	0	2	0	0
Gadwall	0	0	0	2	0	0
Redhead	1	0	0	1	0	0
Ring-necked duck	1	0	0	-	-	0
Ruddy duck	0	1	-	0	1	-
Unidentified	-	13	-	0	24	-
Total	133	29	22	93	36	39

* Ground counts made on August 2-6; Aerial count on August 2.

Table IX. - Aerial VS Ground Counts of the Adult Breeding Population

Species	Adjusted Total Population		
	Ground Count	Aerial Count	Percent Seen from Air
Mallard	516	181	35
Blue-winged teal	300	70	23
Pintail	110	51	46
Baldpate	62	12	19
Green-winged teal	68	1	1
Canvasback	48	25	52
Lesser scaup	26	21	81
Shoveler	24	17	71
Gadwall	12	2	17
Redhead	8	2	25
Ringneck	8	0	0
Ruddy duck	2	0	0
Unidentified	0	32	-
Total	1,184	414	35

In further analyzing the data we find that from 45 to 57 percent of the lone drakes were observed from the air while only 23 to 30 percent of the pairs were visible. This parallels observations made on the same area in 1952. Time of day enters into this picture but it is believed that lone drakes are more easily seen from the air due to the fact that they spend more of their time in open water, on muskrat houses and other exposed places while pairs are nesting and feeding in areas of heavier cover.

As in 1952 certain species were more easily picked up from the air than others. This is especially true of diving ducks and the brighter colored and larger ducks such as the mallard, pintail and shoveler. The total percent of ducks seen from the air agreed very closely with 1952 data and if we can assume the error between aerial counts and actual populations to be constant from year to year then aerial censuses are indeed the answer to any extensive breeding pair survey program.

Brood counts from the air have always posed a problem. In 1952 aerial brood transects were cut down to 1/16-mile wide in order to decrease the angle of observation. In 1953 broods observed from the ground "beat out" census were recorded separately depending upon whether they were seen on the "inner" 1/16-mile (nest to the road) or the "outer" 1/16-mile strip of the 1/8-mile transect. Comparative data are shown in Table X.

A larger percentage of broods were seen on the outer strip where the angle of observation was greater but this "lowered observability" may have been offset by the area on the inner strip "blacked out" by the plane itself.

Banding Data

Incidental to the regular survey work 306 ducks were banded. Nearly all of these were retrieved by the dog and represent broods from all over the study area and adjacent areas.

Table X I. - Summary of Waterfowl Banded -- Redvers Study Area

June 27 to August 6

Species	Adult Male	Local Male	Adult Female	Local Female	Total
Mallard	0	109	1	86	196
Pintail	0	4	0	9	13
Baldpate	0	11	1	13	25
Blue-winged teal	1	25	1	24	51
Shoveler	0	4	0	7	11
Redhead	0	3	0	0	3
Canvasback	0	3	0	4	7
Total	1	159	3	143	306

Summary

1. Lack of fall rain in 1952 and almost complete absence of snow during the ensuing winter caused a lowering of pothole levels in the southeastern end of the aspen-parklands. However, the total number of water areas on the Redvers Study Area was the same as in 1952. A severe snowstorm on May 10 and 11 followed by several days of cold weather retarded renesting of mallards to some extent and slowed up the northward migration of the late arrivals but seemed to have no serious effect on nesting success of the mallards, pintails and canvasback. Most of May, June and the first of July was cold, wet and miserable with rain falling almost daily. This cold, wet weather did not appear to have an adverse effect upon nesting or broods.

2. The breeding pair population of 118 pairs per square mile was almost exactly the same as in 1952 indicating that perhaps the area reached maximum carrying capacity in 1952 (2.98 pairs per acre of water). Sixty-one water areas per square mile averaged 0.66 acres each.

3. Nest data indicated 46.1 percent success for all nests found and 50.1 for active nests only. This compares with 45.8 percent for all nests and 56.9 percent for active nests in 1952.

4. The proportion of successful females was 42.8 percent in 1953 as compared to 42.4 percent in 1952.

5. Taking into consideration both nesting, and percent of females with broods, a figure of 45 percent should be a conservative estimate of production which is exactly the same as in 1952. This means that the estimated 118 females per square mile produced 53 broods of an average Class III size of 6.66 or 353 ducklings per square mile. These added to the original 236 adults, represents an increase of from 236 to 589 ducks which is 2.5 times the original population or an increase of 150 percent, and indicates a very satisfactory breeding season.

WATERFOWL BREEDING GROUND SURVEY IN SASKATCHEWAN - 1953

SPECIAL STUDY AREA - KINDERSLEY-ESTON

J. B. Gollop

Methods of Sampling

The 20.5 square mile Kindersley-Eston Study Area consisted of the same 82-mile transect covered in 1952. However, 44 miles of additional transect were included this year -- from Kindersley north to the junction of Highways 30 and 31 and then east to Plenty. Comparable data for 1952 are not available for this new section and it is not dealt with in this report.

It was originally planned to change the study area from a transect-type to a block-type, but this was not done, first, because a linear strip is normally more suitable for ground-to-air comparison and, second, because spring water conditions appeared to be at least as good as in 1952.

Observations were made within 1/8-mile on each side of the road for the breeding pair coverage in May, the breeding pair-brood coverage in June and the brood coverage in July. The transect was not checked in August because of the unsuccessful July results. These surveys were carried out as part of an investigation of waterfowl depredation on cereal crops in the Kindersley area. Mr. D. L. Hurst, Canadian Wildlife Service, assisted the writer in these investigations from May to September.

Weather and Early Spring Populations

The area was first visited on April 5 and 6 this year when 150 miles were covered by car; pintails and mallards were common and a very few individual pairs of green-winged teal, American goldeneye, baldpate and canvasback were seen. Practically all water areas less than an acre in size were completely open and the larger sloughs were partly open. Snow was confined to ditches, windbreaks and snow fences.

The week of April 12 brought record-breaking below-freezing temperatures and snow. The transect was again visited on April 15 by car and on April 17 by plane. The absence of waterfowl on the study area and vicinity was striking. Practically all field sloughs, as well as lakes, were frozen solid. Only two large flocks of pintails and mallards were seen (300 + or - and 3,000 + or -) on the April 15 trip which involved 310 miles by car. The April 17 flight found an estimated 16,500 ducks, 8,000 Canada geese, and 3 snow geese along a 95-mile stretch of the South Saskatchewan River (Empress, Alberta to Kyle, Saskatchewan), part of which lies 15 miles south of the southern section of the transect.

Canada geese north of the Saskatchewan River totaled 30 on the April 17, 1953 flight compared to 1,065 + or - on an April 18, 1952 flight (the River was not covered in 1952). Snow and blue geese were absent this year while 1,900 + or - were estimated on the 1952 flight.

On April 17, there was still a little snow in the southern part of the district, but some side roads were drifted in north of Kindersley.

On May 10 and 11, shortly after the two dominant species had settled down to serious nesting, a snowstorm left snow on the ground for almost a week. There then followed a summer of approximately normal precipitation until mid-June and above average rainfall until the end of July.

Water Conditions

Areas of surface water on April 5 and 6 totalled 285. There were 250 areas of surface water on May 20, 170 on June 10 and 45 on July 16. The May-June drop was 32 percent this year compared to 44 percent in 1952. The May-July drop was 83 percent in 1953 compared to 65 percent in 1952.

Twenty-seven water gauges recorded drops varying from 0.23 inches per week to 3.59 inches per week for the 10-week period May 8-9 to July 15-17. Three successive sloughs near Eston registered drops of less than 1 inch per week as well as 4 sloughs near Brock, 24 miles north. In between were 4 successive areas with drops of over 2.50 inches per week. In addition to the usual factors involved, heavy showers and the wide-spread use of slough-water for mixing with herbicides and insecticides are important in this district.

Precipitation from April 1 to July 23 at Kindersley was 1.40 inches above the normal of 5.93 inches.

The surface water situation this year was not as bad as it might appear. The areas remaining in July were large (many more than 5 acres) and generally well scattered. The apparent decrease in the number of sloughs was actually more an indication of a decrease in the size of the larger areas.

Breeding Population Trends

The data for the two breeding pair coverages, both ground and air, for 1953 and 1952 are to be found in Table I.

The breeding pair population on the transect this year was 34 percent below that of 1952:

1953 : 50.1 pairs per square mile

1952 : 75.2 pairs per square mile

The density figure used in last year's report was the average of 4 coverages - 58.8 pairs. It is now felt that this was not a satisfactory method of determining the population and so the two 1953 coverages have been compared with the two 1952 coverages which most closely approximate them chronologically. The pintail and mallard figures for May have been combined with the highest count for each of the other species. Many pintails and mallards seen this June were in flocks of 50 to 200.

Significant decreases were recorded for all species except mallard which showed a 22 percent increase. With a 38 percent decrease in the pintail population, the ratio between these two species was more nearly equal in this part of the mixed prairie:

1953 - Mallard-Pintail : 1 : 1.4

1952 - Mallard-Pintail : 1 : 2.8

Mainly because of the mallard increase, these two species this year made up 69 percent of the waterfowl population in the area compared to 58 percent in 1952.

Nesting

Nest hunting was largely confined to buckbrush (Symphoricarpos sp.) and stubble fields. These latter were driven by car and walked with a rope between two observers, but proved singularly unproductive, particularly in comparison with last year.

That the May 10-11 snowstorm and cold weather did not adversely affect mallard production is indicated in the following mallard nest data. Clear-cut nest histories were few and these were largely for nests in buckbrush.

Of 17 nests begun before the storm, 15 (88 percent) were still being incubated after it; the average clutch was 9.4 eggs. The other two clutches were fresh when found before the storm and may have been deserted because of the storm or disturbance by the workers. Twelve of these 15 nests eventually hatched, the other three apparently being lost to predators. Thus, if this sample were representative, it would seem that such mallard nests were not seriously affected by the snow and cold weather. It is admitted that the writer does not know the actual percentage of hens deserting because of the storm and not renesting. It should be noted, however, that large numbers of mallard broods showed up all season - the latest seen was a brood of five that hatched during the first week in August.

On the other hand, nearly all pintail nesting activity was definitely stopped early in June in the Kindersley district. The explanation here might be primarily the result of two factors:

1. Pintails and mallards arrived about the same date as last year but the former apparently settled down to nesting a week or two ahead of the latter, as was the case last year. In both species, however, this was about a week behind 1952 - possibly because of the early freeze.

2. Pintails are primarily stubblefield nesters in this part of the grassland, particularly for their first attempts, while mallards seem to prefer the buckbrush clumps. Agricultural operations (seeding on stubble and summer-fallowing) in May and early June, therefore, affected a much higher percentage of pintail nests than mallard nests, and nests of pintail were in later stages of incubation than mallards. Many of these first pintail attempts were successful in this area but practically all of those hens unsuccessful by the first week in June - those losing well-incubated first nests and even many second attempts - apparently ceased nesting activities for the season in the Kindersley-Eston Area.

Evidence that little pintail renesting might be expected was first noted in the sex ratio of parts of two flocks seen on June 17 and 18 near Eston: 49 drakes: 87 hens. A third flock of pintails and mallards, the former dominant, was composed of 26 drakes and 34 hens. That banding drives in the district between July 19 and 22 caught a high percentage of pintails ready to fly, but very few Class I and II birds, is further indication that first attempts represented a relatively large proportion of the successful nests.

Predators were apparently more common in the area this year, with skunks making the greatest gains. Feral cats, weasels, badgers, ground squirrels, hawks, crows and magpies were also present.

Broods

By early June of this year pintail-mallard production was on a par with last year's early effort -- 78 percent of the 1952 breeding population producing 73 percent of the 1952 broods in about the same period:

	Pintail	Mallard	Others	Total	Density
June 10-11, 1953	77 broods	42 broods	5 broods	124	6.1 broods per sq. mi.
June 3-5 , 1952	132 "	37 "	6 "	175	8.3 " " " "

Class I, June brood sizes this year, however, were down for these two species (counts made off transect also included):

June, 1953 :	Pintail 5.4 young (112 broods)	Mallard 6.4 young (63 broods)
June, 1952 :	Pintail 7.4 young (93 broods)	Mallard 7.9 young (23 broods)

The reason for this might be twofold: Agricultural operations may have hit at a more crucial period with the result that hens affected by them and yet not deserting returned to bring off that part of their clutch not destroyed. Also, a higher predator population may have taken a higher toll of young as broods made their way across country from nests or drying sloughs. The possibility that only part of a set of equally developed embryos might be affected by exposure to cold weather may also enter into the picture.

The difficulty of conducting a satisfactory brood census by means of a 1/4-mile transect in a district where large water areas predominate in July and August was more apparent this year than last. Seventy-seven percent of the July broods recorded within the transect were on nine large areas, partly, and often largely, stretching beyond the boundary of the strip. The remaining 23 percent were on 13 small areas wholly within the transect. The difficulty arises when broods hatched in May and June near small sloughs in the transect move in July and August to larger areas (many more than half a mile across), which have also attracted broods hatched near small early season ponds outside the transect. Loafing bars, cover and open water are found in and out of the transect on these key areas and with so few of them in the late summer there is little chance of all the variables evening out on one coverage if, indeed, they would ever do so. Because of the dense cover and the size of these sloughs it is difficult to get accurate data on them at any time. As indicated above, sloughs within the transect were more numerous during the first half of June, 1953 than in 1952. By mid-July of this year, however, there were fewer water areas than in mid-August of last year.

Before presenting the resulting data, another complicating factor must be explained: On July 17, 1953, two investigators drove 272 + or - young of 6 species from a dense stand of spikerush (Eleocharis, sp.) into open water just long enough for them to be counted without getting species or age data. Three days later, Floyd A. Thompson, U. S. Fish and Wildlife Service, with a 6-man crew trapped 365 + or - young in the same patch of cover; possibly 20 or 30 birds escaped. The youngest ducklings were released immediately and then 98 shovelers, 88 pintails, 55 blue-winged teal, 36 mallard and 10 baldpates were banded. The writer has not the age classes for the 287 birds banded nor a species count for the 80 + or - ducks not banded. This one area held 30 percent of the broods on the transect.

The data calculated from the June and July brood surveys are as follows:

		Actual Broods			Potential Later Broods		
		Pintail	Mallard	Other & Unident.	Pintail	Mallard	Other & Unident.
June 10-11	Class I	76*	42*	5*	140+	152+	272+
July 15-17	Class I	8*	13*	13*	0	3*	6*
"	Class II	6*	19*	10*			
"	Class III	25	10	2			
"	Feigning Females	3	5	11*			
July 20	Special Area	16	6	38*			
	July Total	58	53	74	Total: 9		Total: 194

*Figures used to compute minimum brood density for area (cf. below).

Based on the July coverage only, a density of 9.5 broods per square mile is obtained. That the July data are not reliable is evidenced by an examination of the pintail-mallard figures: In June, 118 broods of these 2 species were seen and at least 292 potential later broods indicated; by the time of the July coverage the 118 actual broods would have been in age class III but still not flying, and yet only 35 of them showed up. Also more actual broods of these 2 species were recorded in June (118) than in July (111 plus possibly 6 others from the unbanded young on the area described above) in spite of the fact that at least 46 additional Class I and Class II broods had hatched between coverages.

Because of these difficulties the best production figure available for the Kindersley-Eston study area is a minimum of 12.2 broods per square mile -- 52 percent of the 1952 figure (23.5). This density was compiled from the figures marked with an asterisk in the above table. Class III July broods were omitted to avoid duplication of counts; because of this it was felt desirable to omit mallards and pintails of unknown age banded on the area described above and feigning hens of these species elsewhere on the transect; feigning hens of other species were included because of the low percentage of Class III's among known-aged broods.

Ground-To-Air Comparisons

As can be seen from Table I, the over-all breeding pair decrease from 1952 to 1953 is essentially the same whether calculated from ground or air data. However, an examination of individual species trends brings out discrepancies. While diametrically opposed teal figures may not be important in this district, those for mallards (+22 percent as compared to +57 percent) would seem to be more serious.

A July 15 aerial coverage (1/16-mile each side of road) was made around the regular transect and then parallel to the transect a mile north and a mile east. These coverages (corrected for air) compare as follows with the ground data for July 15-17:

	Actual Broods	Potential Broods	Total
Regular Air	72	26	98
Offset Air	40	68	108
Ground	185	9	194

Because of the dubious accuracy of ground data, it is difficult to assess the aerial work.

Banding

One phase of the waterfowl depredation investigations called for the banding and marking of locally-raised (preflight) young mallards and pintails. Between June 18 and August 27, two workers spent the equivalent of almost 5 weeks banding, on 118 sloughs, 1,139 ducks of which 941 were preflight young of the 2 species mentioned above; details are presented in Table II. Until about mid-July fish-landing nets were used and the birds were caught either in the water or after being driven onto land. For the remainder of the period a Golden Labrador Retriever, owned by M. W. Morgan, Kindersley, Saskatchewan, was added to the crew and had to be credited with 5 out of every seven ducks banded thereafter: the dog caught approximately 800 birds in the 20 days he was used.

Mr. Floyd A. Thompson, U. S. Fish and Wildlife, working with a 6-man crew, conducted 7 drives in the area from July 19 to 22 and August 12 to 13 and banded approximately 900 young ducks. As a result of the efforts of these 2 crews a grand total of 812 locally-raised mallards and pintails were marked by means of yellow plastic neckbands with black symbols.

Most young mallards and pintails banded were aged to the nearest week, based on diagrams for each species prepared by L. H. Blankenship (1952 M.Sc. Thesis, University of Minnesota). These data have been graphed as follows:

Table I. - Kindersley-Eston, Saskatchewan Study Area (20.5 Square Miles) Breeding Population - 1953-1952

Pairs Represented	Pin-tail	Mall-ard	Shov-eler	B-w. teal	Bald-pate	G-w. teal	Gad-wall	Scaup	Red-head	Canvas-back	Ruddy duck	Unid.	Total
Ground - 1953													
May 20-21 *	412	293	92	68	52	12	28	29	1	8	0	21	1,016
June 10-11	X	X	82	68	53	6	27	17	3	15	1	X	X
Ground - 1952													
May 20-22	664	241	146	123	91	35	24	24	2	2	1	14	1,367
June 3-5	806	360	169	174	103	71	44	37	12	22	0	5	1,803
Ground - 1953-1952													
Combined, 1953	412	293	92	68	53	12	28	29	3	15	1	21	1,027
Combined, 1952	664	241	169	174	103	71	44	37	12	22	0	14	1,551
Air (1953-1952)													
May 19, 1953	182	144	16	16	27	3	4	1	1	1	0	64	459
May 18, 1952	345	92	30	10	25	2	8	2	0	2	0	172	688
Percent Change (1953 over 1952)													
Ground, Combined	-38	+22	-46	-61	-49	-83	-36	- 22	-75	-32	0	-	- 34
Air	-47	+57	-47	+60	+ 8	+50	-50	- 50	+100	-50	0	-	- 33
Percent Drakes (1953) Ground													
May 20-21	77	69	54	57	53	60	50	57	(Insufficient Sample)				67
June 10-11	X	X	73	73	65	55	56	53	"	"			X
Air													
May 19	79	75	62	52	50	(Insufficient Sample)							72

*The following groups of drakes and hens (listed by sloughs) have been omitted from these totals (♂ : ♀) :

Pintails: 5:1 4:2 2:1 2:1 2:1 6:3 3:1 7:3 5:3 19:6 3:1 4:2 3:1 8:2 5:1 9:2 3:1

Mallards: 6:1 2:1 Shoveler 2:1 4:2 G-w. Teal: 4:1 Canvasback: 2:1

X - Because of flocked pintails and mallards on the June, 1953 coverage, items so marked could not be calculated.

Table II. - Summary of Birds Banded from May 20 to August 27, 1953*

J. B. Gollop and D. L. Hurst, Canadian Wildlife Service

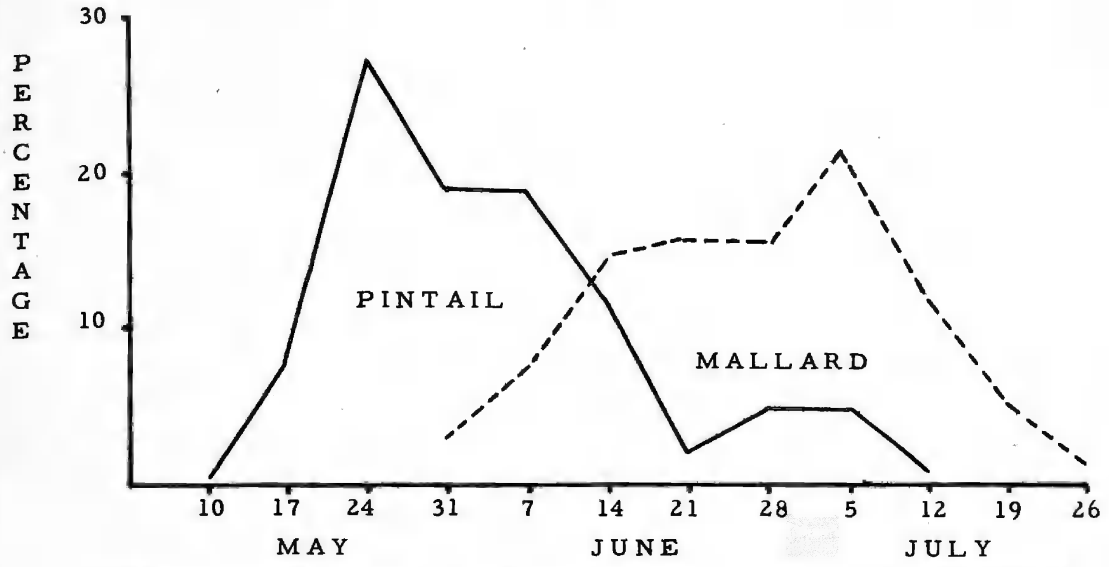
Species	Adults			Flightless Young			Total
	Male	Unsexed	Female	Male	Unsexed	Female	
Mallard	-	-	14	272	1	252	539
Pintail	-	-	3	224	1	191	419
Baldpate	-	-	2	31	2	25	60
Blue-winged teal	4	-	6	16	-	22	48
Shoveler	-	-	-	17	-	20	37
Green-winged teal	3	-	2	10	-	6	21
Gadwall	-	-	-	7	-	3	10
Canvasback	-	-	-	2	-	-	2
Redhead	-	-	-	1	-	-	1
Lesser scaup	-	-	-	-	-	1	1
Ruddy	1	-	-	-	-	-	1
Sub Total	8	-	27	580	4	520	1,139
Coot		2			63		65
Sora Rail		8			5		13
Others (19 species)		1			100		101
Grand Total	8	11	27	580	172	520	1,318

* Equivalent of 32 days spent catching pre-flight young: A Labrador Retriever was used on 20 days.

Neckbanding of Local Young in Kindersley District

Species	Floyd A. Thompson	J. B. Gollop	Total
Mallard	128	319	447
Pintail	141	224	365
Total	269	543	812

Percentage Distributions of Estimated Hatching Dates by Weeks for 398 Local Pintails and 513 Local Mallards Banded in the Kindersley-Eston District -- 1953



For a number of reasons, the picture presented does not fully coincide with what it is felt actually occurred. However, two features are indicated which corroborate field observations and earlier discussion. The largest portion of the pintail production in the Kindersley area came off in May and early June and was flying by the end of July; local pintails were scarce through August. Pre-flight mallards of bandable size (3-8 weeks of age), on the other hand, were common through most of July and all of August.

Summary

Two extremely cold spells in April and May were experienced in the Kindersley-Eston Area; their effect on nesting waterfowl is not clear. Surface water conditions in the transect were good in the early spring, held up well until mid-June and then deteriorated rapidly. There was, however, a good distribution of large sloughs in the district throughout the late summer.

Two coverages for breeding pairs indicated a density of 50.1 pairs per square mile, a 34 percent decrease from 1952.

Brood survey conditions were unsatisfactory in July, but a minimum density figure of 12.2 broods per square mile was obtained, better than 50 percent of the 1952 figure.

The ground-to-air comparison showed an over-all decrease of the same magnitude for breeding pairs.

Approximately 2,000 locally-raised young ducks were banded in the district by two crews; 812 young mallards and pintails were neckbanded.

WATERFOWL BREEDING GROUND SURVEY IN MANITOBA

Arthur S. Hawkins

The seventh annual waterfowl survey in Manitoba started in April soon after the ducks arrived and ended in September when most of this year's crop was on the wing. As in the past, two aerial crews using the standard transect method measured the changes in numbers of waterfowl and water areas. One crew using a light plane covered the agricultural belt (strata A and B), while another using an amphibian, covered the hinterlands (strata C and D). Nearly two dozen conservation officers of the Manitoba Game Branch, students and biologists assisted in ground surveys which had as their objectives not only measuring trends but also evaluating production in relation to weather and habitat conditions, determining relative numbers and success of the waterfowl species present, testing techniques used in appraising populations and banding significant numbers of young ducks.

A roster of the 1953 waterfowl survey party is given below:

Aerial Crew (Grumman Goose) - Hinterland Coverage
E. G. Wellein, Pilot; C. W. Newcomb, Observer (Fish and Wildlife Service)

Aerial Crew (Piper Supercub) - Prairie and Lowland Coverage
A. P. Noltemeier, Pilot (Fish and Wildlife Service); D. G. Colls, Observer (Canadian Wildlife Service).

Ground Crew - Manitoba Game Branch Transects
Officers Serafin, Henderson, Goodey, Krentz, McEwan, Roper, Gilmore, Schindler, Shand, Beck, Newman.

Ground Crew - Newdale-Erickson Pothole Area
W. H. Kiel, C. D. Evans and A. S. Hawkins (Fish and Wildlife Service); G. Parsons (Manitoba Game Branch); D. B. Reid (Canadian Wildlife Service).

Ground Crew - Elkhorn Pothole Area
J. Howard (Manitoba Game Branch); D. B. Reid (Canadian Wildlife Service); G. Pospichal (Fish and Wildlife Service).

Banding Crew - Potholes
D. Kreible, R. C. Tice and A. S. Hawkins (Fish and Wildlife Service).

Banding Crew - Delta Marsh
A. S. Hawkins, C. D. Evans and W. H. Kiel (FWS); N. Mulder (Wildlife Management Institute).

Special Population Studies - Graduate Students

A. Dzubin (University of British Columbia and Wildlife Management Institute)
S. T. Dillon (University of Wisconsin and Wildlife Management Institute).
M. E. Weller (University of Missouri and Wildlife Management Institute).

Methods

The only innovation of note in aerial surveys was the use of a dictaphone in recording ducks seen in heavily utilized areas (see page 83 of Special Scientific Report: Wildlife No. 21 for previous experience with this technique). Otherwise the sampling

system described in the 1951 and 1952 breeding ground survey reports was repeated. Ground work remained the same except that a new study area was established in the southwestern part of the Province. Findings from this new study and from the five-year old Newdale-Erickson study area are reported separately as is the aerial exploratory work in the Arctic portion of Manitoba.

Weather and Water Conditions

Heavy rains during September 1952 replenished the potholes in the Newdale-Erickson district in southwestern Manitoba and in the district bordering Saskatchewan between Tilston and McAuley. However, the rains missed the drought areas in the south and southeastern parts of the Province. March snows and a good run-off further helped the two areas mentioned above but again the drought areas failed to benefit. A large part of Manitoba's production unit (stratum A) was thus out of commission when the ducks returned. (See page 42, Special Scientific Report No. 13, for location of Strata).

This was a very erratic breeding season including at least three periods of extremely adverse conditions. Spring came unusually early resulting in major influxes of geese, mallards and pintails in late March and early April. Then on April 15 the worst spring blizzard in many years and several days of freezing weather caused the first of a series of set-backs. Another record-making blizzard occurred on May 11. Both blizzards as well as smaller snow storms on April 24 and May 14 produced snow drifts which could have buried a large number of nests. A few buried nests were found after the snow melted. Temperatures accompanying these blizzards were low enough to freeze unprotected eggs.

More adverse weather occurred between May 24 - June 5, an almost continuous period of rains, fogs and clouds during which 5 inches or more of rain fell over much of the pothole country. These rains which replenished the potholes came during the period that the initial hatch in mallards and pintails should have reached a peak, judging from the eggs gathered in the wild which were hatched in incubators at Delta.

Extremely lush vegetation resulting from the abundant rainfall may have been a factor in reducing predation late in the season, permitting an unusually successful late hatch. These rains also delayed summer fallowing thus saving many nests normally destroyed. From the standpoint of lateness, 1953 ranks second to 1950 during the seven years of our studies.

Flooding was destructive to nesting in some areas notably the Saskatchewan River Delta and marshes of the Central Manitoba Basin.

One general observation concerning the relationship of weather to the breeding season can be reached after observing eight Manitoba springs: a "normal" spring is abnormal. Rarely has a spring, during the period 1946-53, failed to produce some new record - wettest, driest, coldest, hottest or various combinations of one or more of these extremes. We still lack sufficient years of careful breeding ground appraisals to accurately predict production based on spring populations and conditions. Conditions this spring, for example, shed some light on: (1) how much snow and freezing weather it takes to seriously disrupt the breeding season, (2) how late in the season and under what conditions ducks will re-nest, (3) the effect of a prolonged period of cold wet weather just as the main hatch is starting. We concluded that if water conditions and habitat are favorable the duck population exhibits remarkable resilience when confronted with very unfavorable weather.

Drought conditions in southwestern Manitoba resulted in conditions at Whitewater Lake which appeared ideal for a severe botulism outbreak. Fortunately cool weather reduced this threat but even so, total losses this year were higher than any year since 1949. Several thousand ducks were victims. Whitewater Lake is now at its lowest level since the big drought of the mid-thirties.

Breeding Population Trends

The aerial data indicate no significant change in waterfowl breeding populations for Manitoba this year as compared to 1952 (see Table I). A marked decrease was shown for strata A and B (-38 percent and -18 percent respectively). Stratum C on the other hand showed an increase of 200 percent which approximately cancelled out the loss in strata A and B. The mallard and scaup were responsible for the large increase in stratum C in Manitoba. The scaup is responsible for the 17 percent increase indicated for the Saskatchewan River Delta (stratum D). A total duck index by species for the various strata is given in Table II.

Stratum A in Manitoba showed little change in species composition (Table III) with the exception of a small increase in scaup. The relative abundance of the mallard in strata B and C rose sharply this year over last.

Findings on Manitoba Game Branch ground transects for a 3-year period are given in Table IV. Note that in Districts 1 and 8, where water levels were better this year than last, populations have increased whereas the reverse is true in the drought area. According to these transects, no significant population change has occurred in stratum A comparing 1952 and 1953. Additional trend information for Manitoba can be found in Kiel's separate report. Table V shows species trends in District 8 from 1949 to 1953. Table VI gives similar information for the Roseneath Study Area, an above-average unit located in District 8.

Success of the Season

Aerial production surveys were limited to strata A and D due to the low densities prevailing elsewhere which made brood counting impractical. In both strata, sizeable decreases in production were recorded. However, ground studies revealed that a large percentage of this year's production appeared after the aerial counts were completed.

We concluded that in southern Manitoba where water conditions had been good throughout the breeding season, total production was not far below the 1952 level. In that part which had been dry, however, it was considerably below the 1952 level resulting in an over-all decrease estimated at about 25 percent.

The decrease in stratum D, evidently resulting from floods, could not be pegged accurately because a follow-up survey to determine late production could not be made. We do not know how the increased breeding populations fared in stratum C.

Based on information at hand, total production in Manitoba in 1953 was moderately lower than in 1952.

Banding Program

During July and early August one crew spent full time attempting to trap and band young ducks before they could fly thus associating them with a specific breeding unit. Unfortunately the great abundance of water areas, the lush vegetation and the unusual spread of the brood season all combined to reduce trapping success. The species, age and sex composition of the thousand which were banded in the pothole area are summarized in Table VII.

During July a few ducks were caught and banded at Delta but most of those shown in Table VIII were taken in August and September.

Summary

Breeding waterfowl populations in Manitoba were about the same both in 1952 and 1953 but production this year was moderately lower. Where habitat conditions were favorable, production was good although delayed by extremely adverse weather during the early part of the breeding season. About 7,000 ducks, mostly juveniles, were banded for distribution and mortality studies. Two special ground studies in Manitoba are reported separately.

Table I. - Waterfowl Trend Data for Manitoba, Based on Aerial Data

	Stratum A	Stratum B	Stratum C	Stratum D	Total
Sample Mile	390.0	128.5	142.2	112.4	773.1
Size (Sq. Mile)	10,368	28,600	67,628	3,964	110,560
1951 Index	472,780	165,880	33,810	78,490	750,960
1952 Index	343,180	143,300	81,150	74,520	642,150
1953 Index	211,610*	157,300	344,910	108,504	822,325
Uncorrected Totals 1953	211,610*	117,260	243,468	87,516	659,854
Percent Change	- 38.3	- 18.2	+ 200.0	+ 17.4	+ 2.8

* Totals for only Stratum A were corrected for hens on nests in 1952. Comparisons between 1952 and 1953 for Strata B, C, and D must be made with uncorrected data only.

Table II. - Total Duck Index by Species in Manitoba, 1953 - Based on Aerial Data

Species	Stratum A	Stratum B	Stratum C	Stratum D	Total
Mallard	89,088	65,594	145,898	29,185	329,767
Gadwall	5,925	2,045	-	542	8,512
Baldpate	11,004	2,045	7,588	4,232	24,869
Pintail	19,256	27,842	2,414	8,572	58,084
G-w. Teal	-	-	1,380	1,953	3,333
B-w. Teal	25,393	13,842	-	3,906	43,141
Shoveler	3,386	-	-	4,557	7,943
Merganser	-	-	76,571	-	76,571
Redhead	6,772	5,663	-	4,231	16,666
Ringneck	-	-	18,281	542	18,823
Canvasback	9,734	2,045	-	9,874	21,653
Lesser scaup	41,052	38,224	85,883	38,953	204,112
Goldeneye	-	-	4,484	108	4,592
Ruddy duck	-	-	-	1,410	1,410
Bufflehead	-	-	2,414	434	2,848
Total	211,610	157,300	344,913	108,501	822,324

Table III. - Species Composition in Manitoba Expressed in Percent - Aerial Data

	Stratum A		Stratum B		Stratum C		Stratum D	
Species	1952	1953	1952	1953	1952	1953	1952	1953
Mallard	40.4	42.1	24.2	41.7	19.4	42.3	26.2	26.9
Gadwall	2.8	2.8	tr.	1.3	-	-	-	.5
Baldpate	4.4	5.2	3.0	1.3	-	2.2	4.8	3.9
Pintail	8.9	9.1	4.6	17.7	-	.7	7.2	7.9
G-w. Teal	1.4	-	1.0	-	-	.4	.6	1.8
B-w. Teal	12.4	12.0	2.9	8.8	-	-	3.1	3.6
Shoveler	3.9	1.6	1.9	-	-	-	2.1	4.2
Merganser	-	-	.4	-	39.8	22.2	4.5	-
Redhead	3.3	3.2	4.7	3.6	-	-	4.1	3.9
Ringneck	1.0	-	tr.	-	12.2	5.3	1.9	.5
Canvasback	8.4	4.6	4.7	1.3	-	-	13.6	9.1
Lesser scaup	11.2	19.4	28.2	24.3	1.0	24.9	27.0	35.9
Goldeneye	.5	-	.6	-	-	1.3	2.3	.1
Ruddy duck	.7	-	.6	-	-	-	.2	1.3
Bufflehead	.5	-	tr.	-	-	.7	.9	.4
Scoter	.2	-	-	-	-	-	4.5	-
Misc.	-	-	-	-	27.6	-	-	-

Table IV. - Total Ducks Seen Along Game Branch Transects in Southwest Manitoba

Transect	District	No. per Sq. Mi.	Total Ducks Seen 1951	1952	1953	Change from 1952-1953 Ducks	Percent
A	1	20.0	919	942	1,131	+189	+20.0
B[1]	2	41.0	1,501	559	336	-223	-40.0
B[2]	3	30.0	369	339	105	-234	-69.0
C	3, 6	12.5	217	140	89	- 51	-36.0
K	8	28.25	2,275	1,586	1,829	+243	+15.0
R	8	4.0	286	279	324	+ 45	+16.0
Total		135.75	5,567	3,845	3,814	+ 31	+ 1.0

Table V. - Number of Ducks and Coots per Square Mile in District 8, 1949-1953

Species	1949	1950	1951	1952	1953
Mallard	28.5	28.5	23.6	32.0	31.7
Gadwall	4.6	4.0	3.5	2.8	1.4
Baldpate	7.8	7.6	6.3	5.7	5.7
Pintail	8.3	8.0	9.4	8.7	9.6
G-w. Teal	4.1	4.6	4.9	4.6	2.0
B-w. Teal	21.1	28.3	21.0	16.4	17.8
Shoveler	4.6	4.9	4.5	2.7	3.4
Redhead	5.1	6.0	4.0	3.2	4.4
Canvasback	8.1	8.9	7.0	6.6	5.5
Lesser scaup	10.7	12.5	12.3	13.7	14.0
Ruddy duck *	2.5	8.2	2.6	1.1	2.0
Miscellaneous *	1.5	2.8	2.3	1.9	1.6
Total	107	124	101	99	99
Coots*	12.4	8.7	8.4	4.7	9.6

*All the above figures are adjusted for hens on nests (assuming a 50:50 sex ratio) except in the ruddy, miscellaneous,ducks, and coots. Based on 50.4 square miles of transect.

Table VI. - Waterfowl Populations on the Roseneath Study Area*

Species	Pairs per Square Mile 1949	1950	1951	1952	1953
Mallard	30.4	22.0		36.0	30.0
B-w. Teal	17.7	27.3		20.7	22.0
Canvasback	10.8	10.7		8.0	5.3
Pintail	5.4	3.3		7.3	6.0
Baldpate	5.4	2.7		8.0	10.7
Shoveler	3.8	8.0		2.7	2.0
G-w. Teal	1.5	-		3.3	1.3
Ruddy duck	5.4	4.0	Data Not Comparable	2.7	2.7
Redhead	5.4	4.7		2.7	2.0
Gadwall	2.3	2.0		2.0	.7
Scaup	-	1.3		.7	1.3
Total	88.1	86.0		94.1	84.0
Coots	-	24.7		12.7	19.3

*The 1953 population was 11 percent lower than that of 1952. This Table was prepared by Alex Dzubin.

Table VII. - Waterfowl Banded on Manitoba Potholes During July and Early August 1953

Species	Adult Male	Immature Male	Local Male	Adult Female	Immature Female	Local Female	?	Total
Mallard	2	-	77	8	-	83		170
Gadwall	-	-	19	1	-	19		39
Baldpate	-	-	30	2	-	34		66
Pintail	1	-	20	3	-	21		45
G-w. Teal	1	-	4	2	-	2		9
B-w. Teal	79	-	117	20	-	99		315
Shoveler	1	-	10	1	-	14		26
Redhead	-	-	23	4	-	29	2(L)	58
Canvasback	-	-	98	10	-	108		216
Lesser scaup	1	-	24	7	-	33		65
Ruddy duck	1	-	-	-	-	-		1
Total Ducks	86	-	422	58	-	442	2	1,010
Coot	-	-	-	-	-	-	-	35

Table VIII. - Waterfowl Banded on Delta Marsh, Manitoba from July 1-Sept. 30, 1953

Species	Adult Male	Immature Male	Local Male	Adult Female	Immature Female	Local Female	?	Total
Mallard	255	527	18	130	508	23	1	1,462
Black Duck	16	9	-	3	3	-	-	31
Gadwall	2	1	-	1	1	-	-	5
Baldpate	6	5	-	4	4	-	-	19
Pintail	9	92	2	29	123	8	-	263
G-w. Teal	5	26	-	3	18	-	-	52
B-w. Teal	289	1,164	1	54	1,155	2	-	2,665
Shoveler	3	33	-	10	46	1	-	93
Wood Duck	3	-	-	-	-	-	-	3
Redhead	21	290	192	213	380	196	1	1,293
Ringneck	-	2	-	-	-	-	-	2
Canvasback	9	18	7	33	17	11	-	95
Lesser scaup	-	-	-	3	-	1	-	4
Ruddy duck	-	-	1	-	2	3	-	6
Hooded merganser	-	1	-	-	-	-	-	1
Total	618	2,168	221	483	2,257	245	2	5,994
Coot	-	-	-	-	-	-	-	24

Note: Nan Mulder, decoyman working for the Wildlife Management Institute, banded 601 of the above ducks and coots during the period specified. In addition he banded 238 ducks, including 223 redheads during the first 9 days of October.

WATERFOWL BREEDING POPULATION AND PRODUCTION IN THE NEWDALE-ERICKSON DISTRICT OF MANITOBA - 1953

William H. Kiel, Jr.

This is a brief report of the waterfowl breeding season on a study area in southwestern Manitoba. The background of this study and a description of the district are given in Special Scientific Report: Wildlife No. 2 (1949), p. 76.

Acknowledgements

A. S. Hawkins (USFWS) and Glenn Parsons (Manitoba Game Branch) conducted the spring breeding pair survey and located the bulk of the nests found. C. D. Evans (USFWS) worked on the nesting study and the brood survey. Others who worked in this district during the brood season are Don Reid (Canadian Wildlife Service), Jack Howard (Manitoba Game Branch), Gerald Pospichal and W. C. Newcomb (USFWS), Alex Dzubin and Tom Bergerud (Wildlife Management Institute), and Hawkins.

Methods

Trends in the breeding population and production were determined by methods described in Special Scientific Report: Wildlife No. 2 (1949), pp. 76-81, and Special Scientific Report: Wildlife No. 13, (1951), pp. 50-52.

Habitat Conditions

Heavy snowfall in March gave a good early spring run-off. Subsequent rains and snow turned the season into the wettest since 1950. The nesting season was marked by sub-freezing temperatures (low of 22° F.) and 4 inches of snow from May 11 to 16, plus exceptionally heavy rains totalling over 4 inches in the period May 24 - June 3.

Table I compares the water conditions of 120 potholes over a 5-year period.

Table I. - Water Conditions of 120 Semi-Permanent and Temporary Potholes

	PERCENT BY YEARS		
Year	Dry by May 31	Dry by July 8 - 25	Dry by September 1
1949	0	0	26
1950	0	0	3
1951	2	19	40
1952	20	45	?
1953	0	0	?

Breeding Population

Phenology

Nesting records indicated that the 1953 breeding season was 7 to 10 days later phenologically than 1952. Adverse nesting conditions apparently staggered the hatch so that an unusually large number of broods were still flightless by mid-September.

Trends

The breeding duck density and species composition changed little from the 1952 season (see Table II). Coots, however, doubled in density. This increase in coots probably is the result of improvement in nesting habitat in this area over the semi-drought conditions of 1952 rather than a real increase in the coot breeding population as a whole.

Table II. - Trends in the Breeding Population, Newdale-Erickson District, Manitoba (50.4 Square Miles of Transects)

	1952 May 6 - 29			1953 May 15 - 28		
Species	Percent Males	Corrected Population *	Percent	Percent Males	Corrected Population *	Percent
Mallard	78	1,614	32	75	1,596	32
Gadwall	53	142	3	54	70	1
Baldpate	56	286	6	55	288	6
Pintail	79	436	9	72	486	10
Green-winged teal	73	230	5	57	102	2
Blue-winged teal	61	824	16	55	896	18
Shoveler	64	134	3	54	170	3
Redhead	56	162	3	57	224	5
Canvasback	66	332	7	57	276	6
Lesser scaup	58	692	14	59	704	14
Ruddy duck	59	66	1	65	128	3
Others	54	102	2	58	92	2
		5,020			5,032	
Ducks Per Square Mile		99.6			99.8	
Trend		--			+ 0.2 %	
Coots Per Square Mile		4.7			9.6	
Trend		--			+ 104 %	

* - Corrected population equals number of drakes x 2.

Production

Broods

Brood production on 120 study potholes did not change appreciably from 1952 (see Table III). Although a slight downward trend is indicated by these figures, late-hatched ruddy and scaup broods did not contribute as they should to the 1953 total. The lateness of the 1953 season is reflected in the high percentage of broods in age Class I.

A road-count survey of 12 transects during the period, July 12-23, showed a 19 percent decrease in number of broods compared to 1952 and gave the following age class composition: Class I - 64 percent; Class II - 17 percent; and Class III - 19 percent.

Table III. - Broods on 120 Study Potholes

Species	July 8-23 - 1952 Broods	July 8-23 - 1952 Species Comp. Percent	July 5-23 1953 Broods	July 5-23 1953 Species Comp. Percent
Mallard	35	34	43	46
Gadwall	1	1	0	-
Baldpate	4	4	4	4
Pintail	10	10	7	8
Green-winged teal	7	7	2	2
Blue-winged teal	16	15	10	11
Shoveler	4	4	5	5
Redhead	3	3	7	8
Canvasback	7	7	11	12
Lesser scaup	5	5	2	2
Ruddy duck	6	6	0	-
Others	6	6	2	2
Total	104		93	

Age Class	No. Broods	Percent	No. Broods	Percent
I	32	36	39	60
II	14	16	12	19
III	44	49	14	22
	90 (+14 unaged)		65 (+28 unaged)	
Trend		—		- 11 percent

Nests

Nesting studies again showed that over-water nesting species have higher nest success than land nesters, and the importance of re-nesting to most dabbling ducks is emphasized (see Table IV). Mallard nest histories showed that nests active during the period of sub-freezing temperatures and snow, May 11-16, were as successful as nests started after May 16. A disproportionate number of mallard nests in the egg-laying stage at the time of heavy rains, May 24 - June 3, were unsuccessful.

Table IV. - Average Brood Sizes by Age Classes, 1949-1953 - Newdale-Erickson District, Manitoba

Year	Class I Av. Size	Class I No. Broods	Class II Av. Size	Class II No. Broods	Class III Av. Size	Class III No. Broods
1949	7.0	329	7.0	138	6.5	130
1950	6.5	173	5.8	71	6.3	86
1951	6.8	302	6.5	128	7.1	99
1952	7.2	166	6.4	66	7.3	67
1953	6.6	261	5.7	122	6.6	44

Table V. - Duck Nest Histories - 1953

Species	Percent Success	No. of Nests
Mallard	37	186
Canvasback	77	77
Pintail	28	29
Redhead	54	26
Ruddy duck	83	23
Blue-winged teal	44	23
Lesser scaup	32	19
Others	37	19
Total		402

Air-Ground Comparisons

During the brood season, a 10-mile transect was flown 4 times in a period of 18 days (see Table V). Aerial observations were made by Alvin Noltemeier, pilot and Charles D. Evans on July 17, 21, and 22, and by John Lynch, pilot and Charles Evans on August 3. A Piper Cub aircraft was used. Broods were counted in 1/16-mile strips on each side of the plane; hence two flights were necessary to cover the 1/4-mile-wide transect.

The aerial counts giving the highest number of broods were made either early or late in the day. Generally, regular aerial brood surveys are not limited to these optimum brood-counting periods. This 10-mile transect represents the open type of pothole habitat and is not representative of the district as a whole.

The same transect was censused by a ground beat-out method during the period, July 20-27, and by a road count on August 5. The data indicate that approximately 30 percent of the broods present were countable from the air under the conditions prevailing.

Table VI. - Air-Ground Comparisons --Transects II, 1953
(2.5 square miles - 10 linear miles)

Method	Date	Time	Wind (mph)	No. Broods
Aerial	7/17	10:00 am	25	16
Aerial	7/21	5:45 pm	25-35	25
Aerial	7/22	8:00 pm	0-5	34
Aerial	8/ 3	6:20 am	1-5	36
Ground road-count	8/ 5	5:15 am to 7:45 am	3-5	52
Ground beat-out	7/20 to 7/27	Throughout the day - Weather variable		113

Another comparison of aerial and ground methods was made on 120 stu dy potholes. These potholes are scattered throughout the 4,000 square mile district and represent the various types of potholes found in this habitat. The results of this comparison of brood survey methods are given below:

Method	Date	Time	Wind (mph)	No. Broods
Aerial	7/17	11:00 am to 4:30 pm	15-20	6
Ground beat-out	7/ 5 to 7/23	Throughout the day - Weather variable.		93

Pilot Noltemeier made the aerial observations. Since only study potholes were observed -- and I pointed these out some distance ahead of the aircraft -- the aerial observer could concentrate on these potholes. This is an advantage for aerial observation not found in most transect flying in this area where pothole densities are commonly 80 per square mile. Wind of 15 to 20 miles per hour at this time of day is very common on the Prairie during this survey season, and brood transects are regularly flown under these weather conditions.

Air-ground comparisons are not available for this district to show whether or not the countability of broods varies importantly from year to year under changing habitat conditions. These 1953 data do indicate, however roughly, that there is a difference between aerial countability of broods in open-type potholes and potholes representing the district as a whole.

Summary

Trends in the waterfowl breeding population and production were studies in a 4,000 square mile district in southwestern Manitoba.

The duck breeding population remained at almost the same density and species composition as in 1952. Brood production, as measured on 120 study potholes and by road-counts, declined 11 percent and 19 percent, respectively. However, late broods probably brought production up to the 1952 level.

Phenologically, 1953 was 7 to 10 days later than 1952.

Air-ground comparisons indicated that time of day and type of habitat affected the countability of broods from the air.

WATERFOWL BREEDING GROUND STUDIES ON THE ELKHORN AREA IN SOUTHWESTERN MANITOBA, 1953

J. Howard[1], G. Pospichal[2], and D. Reid[3]

Introduction

At the beginning of the 1953 waterfowl breeding season, a new study transect was established in southwestern Manitoba. This area, which is 40 miles long, lies on a north-south road that passes through the town of Elkhorn. It comprises all the water areas within a 1/8-mile strip on the west side of the road. The northernmost 10 mile segment of the transect is excellent waterfowl habitat with many large, semi-permanent potholes characterized by heavy cattail borders. The next two 10 mile segments have good pothole types but fewer semi-permanent ponds with much less cattail growth and more wooded borders. The southern 10 miles is the least desirable waterfowl habitat on the transect. The majority of the water areas on this segment are shallow "C" types that have wooded or sedge peripheries. Approximately one-half of these water areas were dry by the time studies were completed in the beginning of August.

The Elkhorn district, in general, is a farming area with a good portion of the land still unbroken. This type consists of unused wood lots or pasture that is sparsely covered with quaking aspen, willow, snowberry, and silver willow. No oak or native conifers are present but some box elder is found along the creek bottoms. The main agricultural crops in this area are wheat, oats, barley, rye, flax, and some corn.

This study area was established principally to make comparisons between ground and aerial observations of breeding populations and waterfowl production. The 40-mile transect was censused from the air at approximately the same time as the ground beat-outs were in progress. The area also offered the opportunity to observe nesting success with the effects of weather and predation. Other things noted on the transect were the relationship of breeding pairs and broods to the pothole type and permanency class.

Weather, Water, and Farming Conditions

Weather conditions in this area retarded farming and were not too favorable for the early waterfowl nesting attempts. During the early part of May, it was hot and dry but changed abruptly on May 10 when a heavy snowstorm with freezing temperatures hit the area. Temperatures for the remainder of the month continued low and precipitation was negligible. By the end of the month it appeared as though the district was going to have a very dry summer. Early in June, heavy rains fell and when water gauges were read on June 8, it was found that most of the potholes

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[1] Howard (Manitoba Game Branch) spent the entire survey period on this project.

[2] Pospichal (U. S. Fish and Wildlife Service) joined the project June 1, replacing Reid.

[3] Reid (Canadian Wildlife Service) worked with Howard during May.

on the northern end of the transect were up as much as half a foot above the May 1 reading. The rains were not as heavy on the southern end of the transect but the potholes were up to or slightly higher than the May 1 levels. Good amounts of rainfall throughout June held water levels nearly constant. They gradually receded during July on the northern end of the transect but dropped much more rapidly on the southern areas. Growing conditions were favorable throughout July, however, some fields were so wet that such practices as 2-4-D spraying of broadleaf weeds, haying, and cultivating of fallow fields were difficult.

Methods and Procedures

Studies began in the area on May 5 when the transect was established. A number and a pothole survey form, to record all observations, were assigned to each water area on the transect. On the original survey, of potholes to be included in the transect, air photos were not available for all the segments. Those available were used to help locate potholes on the transect while the rest of the area was paced out to determine those areas to be included. Pothole type, immediate land use, and emergent vegetation were also recorded on the survey form. The transect was divided into four 10-mile segments which were lettered A, B, C, and D, from north to south. Air photos arrived later in the season and, with the help of these, graph maps of all included water areas were drawn to shape, size, and location. These graph maps, on a scale of 20 inches to the mile, were also used to record all land use, and type of grain crops on the entire transect. At the end of July, the principal species of aquatic vegetation, both submerged and emergent, were recorded on the survey forms.

To maintain records of water fluctuations during the breeding season, 92 temporary gauges were placed in roadside ponds of B, C, and E permanency early in May. These gauges were made of notched cedar lathe. Periodic readings were taken from the notch to the surface of the water. All gauges were placed near the road and on the south side of the selected potholes to make them easier to find later in the season after vegetation had grown enough to obscure them. Frost in the bottom of the ponds in early May prevented the erection of permanent gauges till later in the month. Nine of the temporary gauges were replaced by permanent gauges attached to 2" x 4" posts driven solidly into the bottom of semi-permanent potholes. The gauges were read bi-weekly and the readings recorded on the survey form.

The first breeding pair count was begun on May 12 and was completed in 3 days. At that time, new growth had not appeared to hide the birds and the main cover was old cattail growth and water-killed stands of willow. The method employed on this count was to beat out any water areas where old vegetation hid any part of the pond. In the three additional breeding pair counts that were run at two-week intervals during May and June, the method used was the same as the first but the stands of new vegetation that appeared, made more thorough beat-outs necessary.

During the intervals between the breeding pair counts, the main activities on the study area were mapping, gauge reading, re-checking active nests, and nest hunting. Most of the possible nesting cover in the vicinity of water areas was thoroughly checked for nests. This work was complicated by the abundance of nesting cover which in many instances extended as much as half a mile from a given pond. The largest part of the nest hunting was confined to segment A, the area of highest duck density. A dog was utilized for 2 days and it is our conclusion that one can be

very helpful in this operation, especially in large areas of potential nesting cover. In other attempts, a rope, hung with short pieces of light chain, was dragged by two men over several areas of extensive cover. This method was not too successful in the late nest-hunting. All nests found were numbered and recorded on a nesting form and on the graph map of the transect. Data gathered on subsequent checks of the nest was recorded on the form. All completed nests were shown both on the nesting form and on the graph map. All successful nests were shown on the map by a blue square surrounding the red "X" marking the nest. The "X's" of unsuccessful nests were circled in blue. This method of marking completed nests assisted in checks of active ones that followed.

During the month of July, two beat-out brood counts were completed. The first count, begun on July 13 was completed in four days. On this count, water areas where the cover was not too heavy were beat-out by one man. Areas that were large and those with heavy or extensive cover were worked by two men who beat-out opposite sides of the pond and converged at a sparsely covered spot for better observation. It is felt that this method was not thorough enough to force all broods out into the open. The second brood count was begun on July 29 and completed on August 3. Two crews of three men each were used on this beat-out. One crew made valuable use of a dog and in some cases it retrieved young ducks in as many as three different age classes from a pothole where only one feigning hen was flushed by the beaters. The other three-man crew covered potholes with heavy vegetation cover by sending two men around one side of the pond and the third man around the other side. A few of the largest, most choked-up, areas were worked by all six men and the dog while some of the large open ones were counted by evening observations for periods of up to one and one-half hours. It is felt that a large crew, or the efforts of crews from other areas, at the time of a beat-out brood count gives a more thorough coverage and a more accurate picture of the area concerned.

Discussion and Conclusions

As the Elkhorn Study Area was established only this year, there are no data with which to compare the results of this summer's investigations. Some general conclusions can be reached through examination of the collected information but more important, the results of this year's work will serve as a basis for comparison in future studies in this same area.

Table I is a summary of the four breeding pair counts conducted during the months of June and July. For uniformity and to avoid duplication in computing the breeding pairs, a hen was assigned to each drake that was observed on the transect. Lone hens, although recorded on the study sheets, were discarded when Table I was compiled. The presence of the large numbers of breeding pairs on the 6/11-13 count indicates either a late nesting season or a sizable second nesting effort. Normally at this time of the year, as observed in other study areas in Manitoba, drakes have begun to congregate at the molting lakes and breeding pairs are less in evidence. This, in conjunction with nests observed early in May and adverse weather which was known to have affected nesting early in June seems to indicate a sizable second nesting attempt.

Table II indicates the results of concluded nests on the area. Because of the small size of the sample, no definite conclusions can be reached, although in the

Table I. - Summary of Breeding Pair Counts on the Elkhorn Study Area

Species	Breeding Pairs Per Square Mile			
	5/12	5/26	6/11-13	6/29-7/1
Mallard	33.6	30.4	38.2	18.6
Gadwall	2.2	1.6	2.4	1.4
Baldpate	5.0	3.2	3.6	4.0
Pintail	12.0	7.6	6.2	2.4
G-w. Teal	2.6	2.6	1.4	3.2
B-w. Teal	24.2	26.4	30.6	23.2
Shoveler	7.8	5.8	5.4	3.6
Redhead	-	-	.8	.8
Ringneck	-	-	.4	-
Canvasback	2.0	4.0	4.0	.2
Lesser scaup	.8	3.8	3.2	3.8
Ruddy duck	-	.6	1.4	2.4
Total Ducks	90.2	86.0	98.6	63.6

Table II. - Summary of Nesting Studies on the Elkhorn Study Area

Species	Destroyed			Deserted	Flooded	Hatched	Percent Success	Total No. Nests
	Crow	Skunk	Ground Squirrel					
Mallard	18	7	5	6	7	21	32.9	63 *
Pintail	3	2	1	1	-	1	12.5	8
B-w. Teal	5	1	-	1	3	4	28.6	14
Shoveler	1	1	-	2	-	-	-	4
Ringneck	-	-	-	-	-	1	100.0	1
Canvasback	-	-	-	3	2	5	50.0	10
Ruddy duck	-	-	-	1	-	2	33.3	3 *
Total	27	11	6	14	12	34	32.7	104

* One active mallard nest and one active ruddy duck nest are not included in these totals.

Table V. - Broods by Age Classes on July 16, 1953 on Elkhorn Study Area*

Transect Segments	Age Classes			Broody Hen	Total For Transect	Broods Per Square Mile
	I	II	III			
A	23	6	3	3	35	28.0
B	12	4	2	1	19	15.2
C	12	5	2	6	25	20.0
D	9	0	1	1	11	8.8
Total	56	15	8	11	90	18.0
% in each Age Class	62.2	16.7	8.8	12.2	99.9	

* Including Coot.

Table III. - Brood Data as of July 24, 1953 on the Elkhorn Study Area

Species	Class	Accurate Counts			# Additional Broods		Broods per Sq. Mile
		No. Broods	No. Young	Av. Brood	Poor Count (Broods)	Broody Hen	
Mallard	I	8	67	8.4	7	-	-
	II	3	18	6.0	-	5	5
	III	2	10	5.0	-	-	-
Canvasback	I	1	7	7.0	-	-	-
	II	4	23	5.7	0	0	1.2
	III	1	3	3.0	-	-	-
Blue-winged Teal	I	15	134	8.9	3	-	-
	II	2	2	1.0	1	5	5.2
	III	0	0	0	-	-	-
Pintail	I	1	6	6.0	2	-	-
	II	0	0	0	1	1	2.0
	III	2	7	3.5	3	-	-
Green-winged Teal	I	2	14	7.0	-	-	-
	II	0	0	0	-	-	.4
	III	0	0	0	-	-	-
Shoveler	I	1	6	6.0	-	-	-
	II	1	6	6.0	-	-	.4
	III	0	0	0	-	-	-
Ringneck	I	1	7	7.0	-	-	.2
Lesser Scaup	I	1	6	6.0	-	-	.2
Redhead	I	1	3	3.0	-	-	.2
Unidentified	I	1	10	10.0	1	-	-
	II	0	0	0	1	-	.6
Total		47	329	7.0	19	11	15.4
Coot	I	7	26	3.8	4	-	-
	II	2	8	4.0	-	-	2.6
Total		9	34	3.8	4	-	2.6

Table IV. - Brood Data as of August 3, 1953 on the Elkhorn Study Area

Species	Class	Accurate Counts			No. Additional Broods		Broods Per Sq. Mile
		No. Broods	No. Young	Av. Brood	Poor Count (Broods)	Broody Hen	
Mallard	I	8	52	6.5	15	-	-
	II	2	19	9.5	12	2	13.6
	III	4	24	6.0	25	-	-
Canvasback	I	3	18	6.0	-	-	-
	II	1	5	5.0	1	-	1.8
	III	3	14	4.6	1	-	-
Blue-winged Teal	I	8	62	7.7	10	-	-
	II	9	77	8.5	6	4	11.4
	III	14	129	9.2	6	-	-
Pintail	I	4	26	6.5	3	-	-
	II	2	9	4.5	1	3	3.4
	III	2	13	6.5	2	-	-
G-w. Teal	I	1	3	3.0	2	-	-
	II	0	0	0	1	-	1.0
	III	0	0	0	1	-	-
Shoveler	I	2	12	6.0	4	-	-
	II	2	18	9.0	-	3	2.4
	III	1	10	10.0	-	-	-
Ruddy duck	I	6	37	6.2	-	-	-
	II	1	6	6.0	2	-	1.8
L. Scaup	I	2	18	9.0	-	-	.4
Redhead	I	1	6	6.0	1	-	.8
	II	1	5	5.0	1	-	-
Baldpate	I	3	19	6.3	-	-	.6
Gadwall	I	4	30	7.5	-	-	1.2
	II	1	6	6.0	1	-	-
Unknown		0	0	0	1	-	.2
Teal	II	0	0	0	1	-	.2
Total		85	618	7.3	97	12	38.8
Coot	II	1	8	8.0	6	-	1.4

Table VI. - Number of Broods by Age Classes on the Elkhorn Study Area - August 3, 1953 -- Including Coot

Transect Segments	Age Classes I	II	III	Broody Hen	Total For Transect	Broods Per Square Mile
A	34	25	23	4	86	68.8
B	23	11	14	7	55	44.0
C	17	10	15	1	43	34.4
D	5	5	6	0	16	12.8
Total	79	51	58	12	200	40.0
% in each Age Class	39.5	25.5	29.0	6	100	

Table VII. - Average Water Fluctuations of Pothole Types, by Transect Segments, on the Elkhorn Study Area during the Summer of 1953 *

	Area Permanency Class								
	B Type			C Type			E Type		
Transect Segment	# Water Areas	High (In)	Final (In)	# Water Areas	High (In)	Final (In)	# Water Areas	High (In)	Final (In)
A	15	+4.12	-2.51	7	+3.78	-3.71	-	-	-
B	11	+4.25	-2.50	12	+4.58	-6.85	-	-	-
C	11	+4.73	-3.25	4	+4.44	-8.75	2	+6.87	-3.37
D	12	+2.89	-6.83	7	+2.71	-11.64	1	+8.0	0

* These readings were obtained from 82 temporary water-gauges which were installed in the 3 water-permanency areas early in May. The original reading, at the time of installation of the gauges, was used as zero; the high reading was obtained after the rains in early June (June 8th); the final reading (low) was obtained by August 3rd (between July 30 and August 3).

Table VIII. - Occupancy and Loss of Water Areas During July and August on the Elkhorn Study Area, 1953

Transect Segment	Occupied July 24*	Aug. 3	Unoccupied July 24*	Aug. 3	Dry July 24*	Aug. 3	Original # on Segment
A	36	38	52	42	5	13	93
B	21	28	48	33	5	13	74
C	19	18	28	21	7	15	54
D	23	13	61	49	28	50	112
Total	99	97	189	145	45	91	333
Percent of Total	29.7	29.1	56.7	43.5	13.1	27.3	

* The figures appearing under the date of July 24 were conditions in the field at the completion of the first brood count on July 16, 1953.

case of mallards and puddlers in general, some effects of predators can be observed. An important factor in this study is that these figures represent the first nesting attempt. Later nestings are more difficult to find because of the growth of nesting cover as the season progresses. It could be expected that nesting success would be higher in the later nestings for the reason that they would be less vulnerable to predation.

Tables III and IV are self-explanatory. An interesting point appears in the accurate counts of the Class I broods on these two tables. The Class I broods observed on the August 3 count are apparently the results of second or late nesting efforts. In mallards and blue-winged teal, the average brood size is smaller on the August 3 count than it was on the July 16 count. This coincides with the idea that the clutches of second nesting attempts are usually smaller than the first nestings. These tables also indicate the late appearance of ruddy, baldpate, and gadwall broods.

Tables V and VI show the broods by age classes at the time the two brood counts were conducted. By computing the ages of the broods in Class I from Tables III, IV, V and VI, the peak of the hatch can be calculated. Tables V and VI also indicate trends in production on the habitat types of the four segments of the transect. The number of broods observed decreased steadily on segments A to D as did the desirability of the habitat.

Table VII shows water fluctuations on the different segments of the transect. General water rise on the southern end (segment D) was less than the northern end (segment A) because of less rainfall in that area. From north to south on the transect, the variation between the high and low water gauge readings was progressively greater on both the "B" and "C" type potholes. This could be attributed to a combination of more rain on the northern end, the general land use, vegetative cover, pothole size and other factors. In any event, it shows that the potholes on the segments further north were more stable. Thus, the shore outlines were more stable and cover along the water's edge was more available for waterfowl use. In most instances the water on the areas in segment D had receded so that there was a strip of ground separating the water from the shore cover. Cover within the water was absent in the majority of the water areas there and in most of those that had cover, it was too thick to be attractive to ducks with broods.

Table VIII is a summary of occupancy and of loss of water areas on the transect during the month of July and the beginning of August. It shows the greater loss of water areas toward the southern end of the transect in both coverages. It would be expected that as more of the water holes on the southern segments "C" and "D" dried up, a greater number of those remaining would be occupied by waterfowl that had moved in from the dry areas. This did not appear to be the case as the number of occupied areas also decreased greatly. This might substantiate the thought that the southern part of the transect is not the best of waterfowl habitat.

WATERFOWL BREEDING GROUND SURVEYS OF DUCKS UNLIMITED (CANADA) IN ALBERTA, SASKATCHEWAN AND MANITOBA

William G. Leitch

This report covers the ground transects run by Ducks Unlimited field men in the three prairie provinces and the results from special study areas.

Transects were run the third week in May to evaluate the return of breeding pairs. They were repeated in mid-July to obtain information on water conditions.

Areas for more intensive study were established at Strathmore and at Brooks in Alberta and at Southey and the Caron Potholes in Saskatchewan. The Alberta areas are new and there are no comparative data, the Brooks area had to be discontinued early in the year due to illness of the fieldman. Two years data are available for the Southey area in Saskatchewan and six years for the Caron Potholes.

Data obtained from Keeman cooperators and the annual survey of northern areas have been published in the "Duckological", which is prepared by B. W. Cartwright and issued monthly during the waterfowl season.

Breeding Population Trends

Results of Transects

Alberta

Area - Calgary South (Western "Short Grass" Prairies)
(Via: Strathmore, Mossleigh, Macleod, Pincher Creek, Waterton, Cardston, Macleod, Kepp, Vulcan, Milo, Grants, Hussar.)

	1951	1952	1953
Size of Sample - Square Miles	43	40	43
Breeding pairs per square mile - May	15.2	22.8	41.3
Ponds per square mile - May	4.9	6.6	7.3
Number of water areas per square mile on July 15 estimated to last all season	3.3	2.7	6.5

Area - Calgary North (Western "Short Grass" Prairies from Endiang, Aspen Parkland) (Via: Hussar, Morrin Watt, Endiang, Ranching, Big Valley, Stettler, Delburne, Innisfail, Olds, Sundre, Radnor, Calgary.)

Size of sample - square miles	40	39	40
Breeding pairs per square mile - May	15.1	20.7	28.6
Number of water areas per square mile - May	7.8	10.8	12.0
Number of water areas per square mile on July 15 estimated to last all season	6.1	3.5	9.7

Area - Tilley South (Eastern "Short Grass" Prairies)
(Via: Brooks, Taber, Lethbridge, Del Bonita, Pakowki, Seven Persons, Medicine Hat, Tilley.)

	1951	1952	1953
Size of sample - square miles	36	36	38
Breeding pairs per square mile - May	11.9	18	24.3
Number of water areas per square mile - May	3.6	7.4	7.8
Number of water areas per square mile on July 15 estimated to last all season	2.5	2.6	2.7

Area - Tilley Northeast (Eastern "Short Grass" Prairies)
(Via: Suffield, Jenner, Empress, Cereal, and Hanna to Tilley.)

Size of sample - square miles	38	35	37
Breeding pairs per square mile - May	33.1	29.1	18.5
Number of water areas per square mile - May	4.9	9.5	12.8
Number of water areas per square mile on July 15 estimated to last all season	3.7	4.0	4.0

Area - Hanna Northeast (Aspen Parklands)
(Via: Cereal, Consort, Czar, Killam, Hanna.)

Size of sample - square miles	29	26	28
Breeding pairs per square mile - May	42.9	24.8	38.4
Number of water areas per square mile - May	7.7	13	13
Number of water areas per square mile on July 15 estimated to last all summer	6.3	7.4	9.4

Area - Tofield Southeast (Aspen Parklands)
(Via: Tofield, Wainwright, Vermilion, Two Hills, Ranfurly, Hilliard, Tofield)

Size of sample - square miles	34	34	37
Breeding pairs per square mile - May	5.9	5.9	13
Number of water areas per square mile - May	-	-	9.8
Number of water areas per square mile on July 15 estimated to last all season	-	-	4.7

Area - Tofield Southwest (Aspen Parklands)
(Via: Tofield, Camrose, Bashaw, Ponoka, Thorsby, Leduc, New Serepta)

Size of sample - square miles	27	27	26
Breeding pairs per square mile - May	3	4.3	10.6
Number of water areas per square mile - May	-	-	15.6
Number of water areas per square mile on July 15 estimated to last all season	-	-	8.3

Area - Tofield North (Aspen Forest)
(Via: Mundare, Willingdon, Kaleland, Lafond, Ashmont, Vimy, Edmonton.)

Size of sample - square miles	26	24	25
Breeding pairs per square mile	3.3	5	9.9
Number of water areas per square mile - May	-	-	11.3
Number of water areas per square mile on July 15 estimated to last all season	-	-	2.6

SUMMARY

	1951	1952	1953
Total Provincial sample - square miles	273	261	274
Breeding pairs per square mile	16.4	17.1	24

The transects indicate a further increase of breeding pairs in Alberta again this year. Increases were greatest in the Calgary South area and in the aspen parkland and forest east and north of Edmonton where gains exceeded one hundred percent. Moderate increases in the Tilley South and Hanna Northeast areas were recorded while the Tilley Northeast areas showed a decrease of 36 percent.

July transects indicated that heavy spring rains had supplied ample water to bring the duck crop to maturity.

Saskatchewan

Area - Swift Current Southwest (Eastern "Short Grass" Prairies)
(Bounded on the north by No. 1 Highway, east by No. 4 Highway, and on the south and west by the United States and Alberta borders.)

	1951	1952	1953
Size of sample - square miles	14	14	14
Breeding pairs per square mile - May	8.1	15.7	33.9
Number of water areas per square mile - May	11.1	8.8	10.5
Number of water areas per square mile on July 15 estimated to last all season	2.4	5.8	3.6

Area - Swift Current North to South Saskatchewan River (Western Section Mixed Prairie)
(Bounded south by No. 1 Highway, east by No. 4 Highway, west by Alberta border, and north by the South Saskatchewan River.)

Size of sample - square miles	20	20	20
Breeding pairs per square mile - May	17	25.9	57.3
Number of water areas per square mile - May	15.3	11.2	10.1
Number of water areas per square mile on July 15 estimated to last all season	4.7	4.4	4.1

Area - North of South Saskatchewan River west of Highway No. 4 (Western Section - Mixed Prairie)
(Bounded by the South Saskatchewan River on the south, on the north by Township 34, on the east by Highway No. 4, and on the west by the Alberta border.)

	1951	1952	1953 Comp. to 1952	1953 - New Transects
Size of sample - square miles	16	16	15	32
No. of breeding pairs per sq. mile - May	13.5	36	64.2	58.9
No. of water areas per square mile - May	15.1	15.6	13.4	13.4
No. of water areas per sq. mile on July 15 estimated to last all season	5.2	5.4	4.3	6.0

Area - North of No. 1 Highway, east of Highway No. 4 (Swift Current Area) (Western Section - Mixed Prairie)
(Bounded by No. 1 Highway on the south, No. 4 on the west, on the north by Township 34, and on the east by Range 1, west of 3rd).

	1951	1952	1953
Size of sample - square miles	25	23	25
No. of breeding pairs per square mile - May	11.2	27.5	55.5
No. of water areas per square mile - May	14.5	15.6	14.5
No. of water areas per square mile on July 15 estimated to last all season	5.7	4.8	5.2

Area - Swift Current East (Western Section - Mixed Prairie)
(Bounded on the north by Highway No. 1, on the west by No. 4 Highway, on the east by Range 1, west of 3rd, on the south by the U. S. Border.)

Size of sample - square miles	11	11	11
Breeding Pairs per square mile - May	11.2	20.4	42.2
No. of water areas per square mile - May	11.7	6.1	13.9
No. of water areas per square mile on July 15 estimated to last all season	5.1	4.6	6.6

Area - Wynyard Southwest - Brown Soils (Western Section Mixed Prairie)
(Missouri Couteau, Moose Jaw to Ogema via Highways 2 and 13).

Size of sample - square miles	Not comparable	10	10
Breeding pairs per square miles - May	with	48.9	63.5
No. of water areas per square mile - May	subsequent	19.7	10
No. of water areas per square mile on July 15 estimated to last all season	years	6.5	8.8

Area - Wynyard Southwest - Dark Brown Soils (Eastern Section of Mixed Prairie)
(Bounded on the south by U. S. Border, on the west by Moose Jaw-Radville Railroad and Highway No. 11 Moose Jaw to Saskatoon, on the east by Highways Nos. 9 and 16 to Regina and No. 6 from Regina north to No. 14, and on the north by Highway No. 14).

Size of sample - square miles	Not comparable	30	30
Breeding pairs per square mile - May	with	18.1	17.4
No. of water areas per square mile - May	subsequent	14.8	13.1
No. of water areas per square mile on July 15 estimated to last all season	years	5.3	7.2

Area - Wynyard Southeast - Black Soils (Aspen Parkland)
(Bounded on the south by the U. S. Border, on the west by Highways Nos. 9 and 16 to Regina and by No. 6 north to junction with No. 14, on the east by the Manitoba Border to Kamsack, on the north by Highway No. 5 Kamsack to Watson).

	1951	1952	1953
Size of sample - square miles	Not comparable	25	25
Breeding pairs per square mile - May	with	11.9	10.8
No. water areas per square mile - May	subsequent	17.4	19.7
No. water areas per square mile on July 15 estimated to last all season	years	6.2	10.4

Area - Wynyard North - Degraded Black and Gray Soils (Mixed Aspen and Coniferous Forest).
(Via: Highways Nos. 2 and 55 Prince Albert to White Fox - south to Wadena via Highway No. 35)

Size of sample - square miles	Not comparable	10	10
Breeding pairs per square mile - May	with	4.6	3.7
No. of water areas per square mile - May	subsequent	5.7	5.5
No. of water areas per square mile on July 15 estimated to last all season	years	4.0	5.3

SUMMARY

Total Provincial sample - square miles	161	177
Breeding pairs per square mile	22.0*	38.5

*Reported erroneously as 30.1 in 1952 report.

The transects revealed an over-all provincial increase in breeding pairs of 66 percent, a 7 percent increase in eastern Saskatchewan and 104 percent in the western half of the province.

Decreases were recorded in all except the south-west area of eastern Saskatchewan where the increase offset decreases elsewhere. The increase in western Saskatchewan was general with greatest gains in the areas just south and north of Swift Current.

The July transects (run annually on the 15th of that month) showed abundant water available to bring the duck crop to maturity. Conditions were better in eastern Saskatchewan than in 1952. In the western half of the province there was a decrease in July surface water except on the eastern side of the area.

Manitoba

Due to weather and personnel shortages, Manitoba transects were not completed. The data which were obtained are not comparable with previous years.

STRATHMORE-CALGARY STUDY AREA - ALBERTA

(Area 2 of the U. S. Fish and Wildlife Service)

George Freeman

This is combined project with the United States Fish and Wildlife Service. A transect 26 miles long (6.5 square miles) was laid out between Calgary and Strathmore. Ducks Unlimited did the ground transect work while the Fish and Wildlife Service mapped the area, established water gauges and made air to ground comparisons. The study area was laid out as a straight line transect to facilitate this comparison.

The transect samples the more humid western section of the "short grass" plains of southern Alberta and includes both irrigated areas (with associated seepage affects) and dry land farming, as well as native grasslands.

The results of this year's work are fully reported by Allen G. Smith of the U. S. Fish and Wildlife Service under the Alberta Ground Studies Section of this publication.

CARON POTHOLE STUDY AREA - 1953

W. G. Leitch

The study area, 4 and 1/4 square miles in extent, is located in the mixed grass prairie of the Missouri Couteau approximately 15 miles west of Moose Jaw, Saskatchewan. Here the rugged nature of the Couteau results in typical knob and kettle topography. The area contains 261 small water areas ranging from 1/16 to 5 acres in size. With the exception of 1949, annual breeding pair and brood surveys have been carried out here since 1947.

The 1953 breeding pair count was made May 23 to 26 and brood counts June 22 to 27 and August 14 to 16. The breeding pair count was made by the writer alone, the June brood count with 3 assistants and the August count with 2 assistants. Due to the topography it is possible to obtain a good count of breeding pairs from the hill-tops without disturbing the ducks enough to seriously affect the count. The brood counts were made using the beat-out method which, when enough men are available and the water areas small, is quite effective.

The time of the breeding pair count on May 23, all ponds in the area were well filled with water, although somewhat reduced from last years record high, particularly in the southern part of the area. Heavy late May and June rains increases the water levels until by the brood count of June 23, they were as high as 1952. However, by the brood count on August 14 they were again reduced considerably below 1952 but almost all ponds still contained water.

Table I. - Breeding Population - Caron Potholes

Species	1950	1951	1952	1953
Blue-winged teal	75	90	143	154
Pintail	35	57	79	71
Shoveler	42	52	34	39
Mallard	31	34	111	154
Gadwall	18	33	40	53
Baldpate	28	24	26	39
Redhead	2	10	23	24
Lesser scaup	7	8	9	22
Green-winged teal	1	5	14	9
Canvasback	-	4	5	16
Ruddy duck	1	4	6	6
Unidentified	-	-	-	4
Total Pairs	240	321	490	591
Per Square Mile	56.3	75.5	115.3	139.0

Table I compares breeding populations from 1950 to 1953. The 1953 breeding population is the highest of which we have record for this area. While all species except the shoveler, (the pintail showed a slight decrease 1952 to 1953), have increased greatly since 1950, the mallard has been most spectacular, increasing five fold to become, with the blue-winged teal, the most abundant breeding species in the area. Canvasbacks and redheads have also shown good increases since 1950 and particularly in the last two years. This is not normally a diving duck area and the increase in these species probably results from the continued high waters which have improved nesting cover for them, although it probably also reflects the general increase in these species observed across the prairies.

Table II. - Brood Production - Caron Potholes

Species	1950	1951	1952	1953
Blue-winged teal	12	39	74	108
Pintail	5	28	35	37
Shoveler	11	19	13	32
Mallard	13	10	58	53
Gadwall	8	11	12	14
Baldpate	13	12	17	19
Redhead	2	2	5	7
Lesser scaup	3	7	14	24
Green-winged teal	1	2	7	-
Canvasback	-	1	3	3
Ruddy duck	1	4	-	3
Unidentified	21	15*	31*	12*
Total	90	150	269	312
Per Square Mile	21.1	35.3	63.3	73.4

*Rafted broods on larger waters without females. Total count taken and converted into broods by dividing by six.

In Table II brood data for 1950 and 1953 are compared. From these it can be seen that although the mallard population reached its greatest density in 1953 production was less than the previous year. Based on the breeding population estimates and subsequent brood counts the mallard population was 52 percent successful in 1952 but only 34 percent of the pairs produced broods in 1953. The pintails were somewhat more successful than in 1952. Success in 1952 was 44 percent and in 1953, 52 percent. This may indicate that the pintails were more advanced in incubation at the time of the May snowstorms and "sat the storm out" while more mallards deserted. Since the study area is uncultivated, the normal success of the pintail here may also indicate that the failure of pintails to produce elsewhere was due as much to farming operations as weather.

Of particular interest is the nesting success of the blue-winged teal. One hundred and eight broods were produced from the 154 pairs, a 70 percent success. The blue-winged teal hatch was late as indicated by the data. Only one brood was seen on the June brood count while in 1952, 29 broods were counted on a similar date, and in 1951, 13.

The total production of 73.4 broods per square mile was again a record for the area as far as our records are concerned, exceeding 1952 by 10 broods. In 1952, 54 percent of the estimated breeding population produced broods; 52 percent in 1953. However, the population in the previous year was almost uniformly successful, whereas this year the mallards were only 34 percent successful, the loss here being compensated for by the exceptional success of the blue-winged teal.

In summation, the 1953 breeding population in the Caron Potholes was the largest of which we have record. Brood production was exceptional for the blue-winged teal, about average for the other late nesters and for the pintails, but below average and disappointing for the mallards.

SOUTHEY STUDY AREA - 1953

R. T. Sterling

The study area is located 41 miles north of Regina, Saskatchewan. It comprises a 2 square mile area which is characterized by moderately rolling terrain with numerous small potholes most of which are willow and aspen ringed. The area is 90 percent cultivated.

Only 6 of the 125 ponds in the study area contained water at freeze-up in 1952. All were filled by spring run-off in 1953 and snows and heavy rains during late spring and summer resulted in most being near spring level in August. In August, 96 ponds still contained water as compared to 6 the previous year, and more than half will have a carryover of 6 inches for next year.

The breeding population was determined from a count of territorial pairs conducted on May 22 and 23. Earlier than this heavy snows and freezing temperatures forced most of the pairs to leave the area for larger marshes containing open water. Some pairs became established after the territorial count was made as canvasback,

ruddy duck and green-winged teal broods were counted and no territorial pairs were noted for these species. There is little likelihood that the canvasback or ruddy duck were hatched outside the area.

Production was determined from 2 brood counts, the first was conducted in late June, the second in early August. Ponds were intensively covered with the assistance of a dog. As the dog worked some distance in front of the observer it was impossible to determine how many broods it discovered that would have otherwise been missed. Only in 3 cases in the June count was it certain that broods would have been undetected had it not been for the dog. Due to very heavy cover in most cases only the feigning female indicated the presence of a brood, therefore, few age classes or brood sizes were determined. In June the broods were distributed over the whole area but in August they had concentrated on the same ponds that supported broods in August the previous year. In this case they had not been forced to move due to ponds drying up but apparently moved from preference.

Both the breeding population and the nesting success were greater in 1953 than in 1952. A dog was not used in 1952 and as some territorial pairs were missed in 1953 this would account for some of the apparent difference in nesting success. Most of the increase in 1953 was due to increases in the numbers of the 3 most numerous species breeding in the area, the mallard, blue-winged teal and pintail.

Table III. - Southey Study Area - Breeding Population and Production, 1952-53

	Breeding Population (Pairs)		BROODS					
			June		August		Total Broods	
Species	1952	1953	1952	1953	1952	1953	1952	1953
Mallard	13	19	3	7	2	2	5	9
Blue-winged teal	7	11	-	3	1	2	1	5
Pintail	6	10	2	3	-	1	2	4
Gadwall	1	3	-	-	1	-	1	-
Baldpate	3	3	1	-	1	3	2	3
Shoveler	2	3	1	-	-	3	1	3
Green-winged teal	2	-	2	1	-	-	2	1
Lesser scaup	2	2	-	-	-	-	-	-
Canvasback	1	-	-	1	-	-	-	1
Redhead	1	-	-	-	-	-	-	-
Ruddy duck	-	-	-	-	-	1	-	1
Total	38	51	9	15	5	12	14	27
Per Square Mile	19.5	25.5	4.5	7.5	2.5	6	7	13.5

34.2 percent increase in breeding population 1953-52
107.6 percent increase in broods 1953-52
Brood per pair ratio 1952 - 1:2.4 1953 - 1:1.9

AERIAL WATERFOWL BREEDING GROUND SURVEYS IN NORTHERN SASKATCHEWAN AND WESTERN ONTARIO - 1953

Edward G. Wellein and Wesley Newcomb

Introduction

This report covers aerial surveys of waterfowl populations in Stratum C in western Ontario and Strata C and E in northern Saskatchewan. The objective of the survey was to obtain quantitative information on waterfowl breeding populations in these areas for comparison with the waterfowl breeding season of 1952. The habitat involved in this report, in general, has a low breeding population density when compared with that of the prairie pothole country. The area involved, however, is large and in spite of the low density of breeding waterfowl, contributes materially to the total Continental waterfowl population. It is very probable that during a wide-spread drought in the prairies this area "takes up the slack", so to speak, and becomes far more important in the production of waterfowl. For these reasons, it is considered desirable to obtain breeding population density data in this area.

The writers began the surveys in Ontario in the second week of May and continued the investigations in northwestern Saskatchewan during the latter half of that month. The surveys were made in a Grumman Goose Aircraft owned by the U. S. Fish and Wildlife Service.

Methods Used and Areas Covered

The several strata were sampled by using standard 1/4-mile wide aerial transects. Through necessity, the transects were flown from one refueling point to another. The survey was conducted north to the ice line, beyond which water areas were still ice covered. Waterfowl were recorded by species and separated, when possible, into pairs and lone drakes. Brood surveys were not conducted in the strata involved herein because time would not permit both brood surveys and exploratory work. It is felt that the exploratory work is the more important, the results of which form the basis of a separate report.

The location of the transects flown along with square miles covered, and the size of the strata sampled, are shown in Table I.

Weather and Water Conditions

The phenology this spring was considerably retarded over that of 1952, which was an unusually early season. The last week of May this year found Reindeer Lake and Lake Athabaska still completely ice covered, whereas, they were almost ice free at this time in 1952. During the first half of May the ice line in Ontario extended much further south than it had in previous years. An unseasonable blizzard on May 10 and 11, which caught many hens on nests, extended over most of the area treated in this report, but in spite of this, waterfowl migration appeared to be on schedule.

Water conditions in these strata do not vary markedly from year to year. There is always an abundance of water, and with the exception of those water areas affected by beaver dams, the water levels are remarkably stable.

Table I. - Aerial Coverage - Ontario and Northern Saskatchewan -- 1953

Location	Strata	Square Miles Covered	Strata Area Square Miles
Ontario			
Sioux Lookout to Armstrong to Pickle Lake to Red Lake to Kenora, Kenora to Cairns Lake and return; Mantario Lake to Charron Lake	C	275.5	264,508
Saskatchewan			
North to Nokomis Lake to Lac La Ronge to Ft. McMurray; Ft. McMurray to Prince Albert	C	265.6	110,850
Ft. McMurray to Ft. Smith	E	95.5	25,170
Total		636.6	400,528

Breeding Populations

Listed in Tables II, III, and IV, and computed from the data collected during the survey is the total duck index for the three strata involved. For comparative purposes the information obtained during the 1952 survey is also presented. Unfortunately, data are not available to correct the 1952 figures for hens on nests, and for this reason the 1953 data are presented in two ways--uncorrected and corrected. In making comparisons between years 1952 and 1953 only the uncorrected figures should be used.

A substantial increase in ducks was recorded for Stratum C in Ontario, which amounted to approximately 62 percent over 1952. Mergansers were primarily responsible for the increase, but an increase was also shown for the mallard and ring-necked duck. Scaup decreased markedly in this area. The corrected figures obtained on this survey indicate a total duck index of approximately 710,000 for Stratum C in Ontario.

Waterfowl breeding populations in Stratum C Saskatchewan, showed a decrease this year of approximately 40 percent compared to 1952. Scaup were responsible for the greatest portion of the decrease. A substantial increase was recorded for mallards. Based on corrected 1953 figures, the total duck index for this stratum was computed to be approximately 406,800.

The figures collected in Stratum E Saskatchewan, indicate an increase of about 185 percent in the waterfowl breeding populations for this area over 1952. The mallard was largely, although not entirely, responsible for the increase. On the basis of corrected figures, the total duck index for this area was computed to be approximately 63,400.

Table II. - Total Duck Index in Stratum C (Closed Forest) - Ontario 1952 and 1953

Species	No. Recorded			Percent		Computed Totals		
	Uncorrected 1952	Uncorrected 1953	Corrected 1953	1952	1953	Uncorrected 1952	Uncorrected 1953	Corrected 1953
Mallard	45	103	143	18.9	19.3	74,988	97,868	137,544
Gadwall		7	8		1.1		5,290	7,935
Merganser	75	408	428	31.5	57.9	124,980	391,472	409,987
Ring-neck		76	83		11.3		74,062	79,352
Lesser Scaup	67	38	40	28.1	5.4	111,490	39,676	39,676
Goldeneye	5	12	12	2.1	1.6	8,332	10,580	10,580
Bufflehead		3	4		.4		2,645	5,290
Black Duck	19			8.0		31,741		
Unidentified	27	22	22	11.4	3.0	45,231	21,161	21,161
Totals	238	669	740	100.0	100.0	396,762	642,754	711,525

Table III. - Total Duck Index in Stratum E (Open Forest Tundra) Saskatchewan 1952 and 1953

Species	No. Recorded			Percent		Computed Totals		
	Uncorrected 1952	Uncorrected 1953	Corrected 1953	1952	1953	Uncorrected 1952	Uncorrected 1953	Corrected 1953
Mallard	3	39	66	4.3	27.4	755	10,319	17,367
Merganser	9*	28	38	13.2	15.8	2,517	7,299	10,068
Ring-neck		6	6		2.5		1,510	1,510
Scaup	47**	60	62	68.1	25.7	12,585	15,857	16,360
Bufflehead		6	6		2.5		1,510	1,510
Scoter		30	30		12.4		7,804	7,804
Unidentified	10	33	33	14.4	13.7	2,769	8,809	8,809
Totals	69	202	241	100.0	100.0	18,626	53,108	63,428

* Mergansers, buffleheads, goldeneyes, and scoters combined.
** Scaup and ring-necked ducks combined.

Table IV. - Total Duck Index in Stratum C (Closed Forest) Saskatchewan, 1952 and 1953

Species	No. Recorded			Percent		Computed Totals		
	Uncorrected 1952	Uncorrected 1953	Corrected 1953	1952	1953	Uncorrected 1952	Uncorrected 1953	Corrected 1953
Mallard	47	166	282	8.7	28.9	46,558	68,727	117,501
Baldpate		19	24		2.5		7,759	9,977
Pintail	11	10	18	2.0	1.8	11,085	4,434	6,651
G. W. Teal		4	4		0.4		2,217	2,217
B. W. Teal	4			0.7		3,325		
Merganser	93*	165	238	17.3	24.5	92,005	68,727	98,656
Redhead	2	4	4	0.4	0.4	2,217	2,217	2,217
Ring-neck		16					6,651	
Canvasback	14	10	18	2.6	1.8	14,410	4,434	7,759
Scaup	313**	230	244	58.2	25.1	309,272	95,331	101,982
Bufflehead		11	16		1.6		4,434	6,651
Scoter		5	5		0.5		2,217	2,217
Unidentified	54	122	122	10.1	12.5	53,208	49,883	50,991
Totals	538	762	975	100.0	100.0	532,080	317,031	406,819

* Mergansers, buffleheads, goldeneyes, and scoters combined.
** Scaup anf ring-necked ducks combined.

Success of the Season

No studies on breeding population success were made in the strata covered herein, and therefore no information is available on this matter. Although the season was later than that of 1952, the weather in general was not exceptionally adverse and, considering the stability of water conditions, there is no evidence to indicate that the breeding population was not moderately successful.

Summary

1. The waterfowl breeding population in Stratum C Ontario showed an increase of approximately 62 percent, Stratum C Saskatchewan, a decrease of about 40 percent, and Stratum E Saskatchewan, an increase of approximately 185 percent. Considering Strata C in Ontario and Saskatchewan as one unit, and using the uncorrected total duck index for the years 1952 and 1953, there has been a change of only plus 3.3 percent in the breeding population for this area (928,842 for 1952 and 959,785 for 1953).

2. The scaup decreased in Strata C in both Ontario and Saskatchewan.

3. The mallard increased in Strata C in both Ontario and Saskatchewan.

4. On the basis of corrected figures, the total duck index for Strata C in both Ontario and Saskatchewan is over one million (1,118,344). Approximately 54.5 percent of the ducks in this area are "sporting ducks", providing mergansers are not considered as sporting ducks.

WATERFOWL BREEDING GROUND SURVEY IN SOUTHERN ONTARIO, 1953

George M. Stirrett

Introduction

A survey of waterfowl breeding grounds in southern Ontario was carried out during the summer of 1953 to measure the current status of waterfowl using the area and to secure information on yearly population trends and breeding success.

Three independent surveys were made. One by the author covered the general area of southern Ontario; one by H. G. Lumsden, Fish and Wildlife Division, Ontario Department of Lands and Forests, was confined to the Tweed District (formerly officially known as the Quinte District) and one by N. D. Patrick, of the same organization, was in the Rideau District. Messrs. Lumsden and Patrick have kindly furnished the author with a copy of their respective reports and their data. This material and my own have been used in making the present compilation. In addition, certain information has been secured from the reports of the Quarterly Survey on waterfowl conditions in Ontario, a service carried on jointly by the Canadian Wildlife Service and the Fish and Wildlife Division, Ontario Department of Lands and Forests.

The area to which the present report refers is that part of Ontario lying south of a line drawn from Sault Ste. Marie in the west to Sudbury, Temagami, Arnprior, and Cornwall in the east. This is the same area reported upon during the past two years. The Tweed District lies within this area in a south central position and the Rideau District constitutes the extreme southeastern section of this area.

The author examined 40 separate areas one or more times between May 1 and July 20. Mr. Patrick examined two areas during the latter part of May and Mr. Lumsden examined 21 separate areas in May and again in July. In all, 63 separate stations were examined.

The spot method of sampling was employed by each observer. Mr. Patrick and the author made their observations by canoe, car or on foot, or a combination of these methods of transportation, and Mr. Lumsden carried out both a ground and aerial survey in his district. The techniques employed were similar to those used in previous years. Neither spot ground surveying nor aerial surveying is entirely satisfactory under southern Ontario conditions but must be used until a more adequate and reliable survey method is developed.

Weather and Water Conditions

Weather and water conditions during the months of May, June and to July 20 were ideal throughout the area under study. No drought or excessive water conditions were experienced in any part of the area. Precipitation was evenly distributed. All inland marshes, ponds and lakes were well supplied with water. Nesting and brood raising conditions appeared to be ideal.

Results of Surveys

(a) Breeding Waterfowl Populations: - On the 63 habitats examined by the three observers a total of 1,222 waterfowl of all kinds were found. This is a slight decrease from 1952 when 1,358 were found, and a slight increase from the 1,141 total for 1951.

The most important species of breeding waterfowl are shown in the table below, arranged according to their order of abundance.

Table I. - List of Breeding Waterfowl in Numerical Rank in Total Population Observed during the past Three Years

Rank	1953	1952	1951
1	Black duck	Black duck	Blue-winged teal
2	Mallard	Ring-necked duck	Black duck
3	Blue-winged teal	Blue-winged teal	Common goldeneye
4	Common merganser	Common goldeneye	Coot
5	Coot	Mallard	Mallard
6	Wood duck	Wood duck	Lesser scaup
7	Common goldeneye	Coot	Ring-necked duck
8	Ring-necked duck	Common merganser	Wood duck

During the past two years the black duck has been the most abundant breeder in southern Ontario. The mallard has undoubtedly increased in abundance during the present year. The ring-necked duck dropped from the second most abundant duck seen in 1952 to eighth in rank this year. On the Conroy marsh area, its best breeding ground, Lumsden found that the population has slightly increased. As indicated in last year's report the ring-necked duck ranked second in abundance in 1952 largely because of the results of an additional survey not available during 1951. The data for 1953 and 1952 are comparable.

(b) Brood Success: - The following table gives a record of the broods observed by all three observers and, in addition, those reported for the area by correspondents taking part in the Quarterly Report on Waterfowl Conditions.

Table II. - Brood Records and Comparison with other Years

	1953		1952		1951	
Species	No. Broods	Average Size	No. Broods	Average Size	No. Broods	Average Size
Black duck	30	5.4	37	6.3	6	5.4
Mallard	19	5.8	19	5.7	2	4.5
B-w. teal	8	6.4	9	8.6	1	6.0
Wood duck	10	4.0	19	5.8	2	7.6
Goldeneye	12	4.7	22	5.1	8	7.3
Ringneck	44	5.6	58	5.3	19	5.9
Common merganser	2	9.0	11	6.0	4	4.2
Coot	3	5.0	2	3.0	6	3.3

From the above figures (when sufficient samples are available) it would appear that there has been little change in the last three years' brood success of any of the species of waterfowl under consideration.

Summary

In southern Ontario, an extensive survey of waterfowl breeding was carried out by the author. More restricted and local surveys were carried out by Messrs. H. G. Lumsden and N. D. Patrick of the Fish and Wildlife Division, Ontario Department of Lands and Forests. The results of all three surveys are summarized in the present paper.

Weather and water conditions throughout the area were ideal for waterfowl nesting and brood rearing.

In all 63 habitats were examined by the three observers and a total 1,222 waterfowl including young were counted. The total breeding population was down slightly from 1952 but up slightly from 1951.

The black duck continued its status as the most abundant breeder in southern Ontario, followed by the mallard, blue-winged teal, common merganser, coot, wood duck, common goldeneye and ring-necked duck.

There was no change in the over-all status of the black duck in the area although in some local situations it had increased slightly. The mallard has undoubtedly increased in numbers during the past year. All other species maintain about the same status as during the past three years.

The records on broods show little change for any species during the past three years.

The season to date has been a favourable one for all waterfowl using the area.

WATERFOWL BREEDING GROUND SURVEY IN QUEBEC AND LABRADOR

W. F. Crissey and R. H. Bain

Introduction

The summer of 1953 marked the second aerial waterfowl breeding ground survey in the Province of Quebec and in Labrador. The 1952 survey was exploratory in nature and consisted of a single coverage of the area, beginning in early May and continuing until mid-July. In 1953, the survey pattern was changed somewhat and the plan was changed to allow for two coverages, the first during May and early June for the purpose of measuring the size of the breeding population, and the second during July for the purpose of obtaining a measure of brood production.

W. F. Crissey and R. H. Bain (U. S. Fish and Wildlife Service) worked as pilot and co-pilot respectively, using a Grumman Widgeon airplane. In addition to the coverage in Quebec and Labrador, this crew covered the Maritime Province for the breeding pair survey and flew eastern Ontario as far west as Kapuskasing for both the breeding pair and brood surveys (the data are included in other portions of this publication). For the breeding pair counts in Quebec the transects did not include the area along Hudson Bay due to a shortage of gasoline at Port Harrison and Great Whale River. However, this area was covered during the brood survey in July. (See Map).

Weather and Water Conditions

The winter was mild throughout the region. Temperatures during March and April were somewhat above normal, which caused an early movement of birds northward. Also, these temperatures apparently caused some of the inland waters to open earlier than usual. According to local reports, it is customary for ducks to move into the mouths of rivers which usually open first and then to move inland as soon as the ice breaks. During the spring of 1953, the inland waters apparently opened at about the same time as the river mouths, and rather than stopping along the coast, the birds moved inland immediately. It appears that the natives along the Labrador Coast depend, to a limited extent, on a spring shoot of waterfowl for food, taking the birds in the river mouths before they move inland. The opportunity to kill birds did not present itself during the spring of 1953 and the natives expressed some concern as to a possible reduction in birds.

During May and June the temperatures were lower than last year, but were about normal for the period.

Precipitation varied considerably within the region. During the winter there was relatively little snow, and in the northern and western portions there was little rain until July, which turned wet and cool. In southern Quebec, and along the coast of Labrador, precipitation during May, June and July was above average. At this time, however, the relationship between factors and waterfowl production is not well understood in the type of habitat of which the bulk of Labrador and Quebec is composed. It seems likely that a shortage of water would never constitute a limiting factor. Although flooding is potentially more serious than a lack of water, it seems unlikely that this would ever be serious over any broad portions of the area.

Low temperatures, rain and snow probably constitute the greatest hazard to successful production, but data are lacking upon which to draw the proper associations. From all that is known, the summer of 1953 seemed to be an average year as far as weather was concerned.

Breeding Populations

The breeding population survey in Quebec and Labrador was conducted between the dates of May 9 - 12, and May 20 - 31. A total of 4,955 miles of overland transects were flown, plus 660 miles of shoreline counts. In 1952, the survey extended over a longer period, the data being gathered between the dates of May 2 - 8 and May 20 - July 8. Since past experience has indicated that the number of adults visible on transects gradually decreases as the breeding season progresses, it seems probable that the number of birds observed during the 1952 survey was less than would have been observed if the survey had been completed earlier. However, the indicated increase is sufficiently great between the two years (index of 787,060 to 1,164,839 or + 48 percent) and it is not likely that the difference in survey periods was entirely responsible. It is concluded, therefore, that there was an increase in breeding population in Quebec and Labrador between 1952 and 1953, although it is difficult to determine the amount. An examination of Table I indicates that the increases took place among the black ducks, scaup, mergansers, and scoter; while goldeneye may have decreased.

In Table I the population index figures are broken down according to the number of pairs, singles and grouped birds observed. Other breeding ground surveys have indicated that early in the breeding season the majority of birds observed will be in pairs, but as the season progresses, a steadily growing proportion of the adults will be observed as lone drakes or as grouped birds. When surveys are conducted at about the same dates each year, variations in the proportion of lone drakes are used as measures of the relative progress of the breeding season. In the east, the black duck is of primary importance and the sex cannot be distinguished. It is assumed, however, that a single black duck during the breeding season is probably a lone drake, since it is extremely unusual to see a lone female during this period. A second assumption included in Table I data is that two black ducks together constitute a pair. In areas of relatively high breeding population in the west, it is fairly common to see two drakes together, and it is probable that some of the paired black duck observations are actually two drakes, rather than a drake and a hen. With the thin density of breeding black ducks throughout most of eastern Canada, it is thought that the chances of drakes getting together is relatively slight and this factor is of little importance.

Considering the surveys of the past two years, it is of interest to note that the percentage of singles was higher in 1952 than it was in 1953. This was expected in view of the fact that the 1952 survey continued through a later date than in 1953.

Table II presents the breeding population index figures according to the four strata into which the region was divided for more efficient sampling. A summary of the shoreline counts which were made during the two years is as follows: (although 1,550 miles were flown in 1952 as compared to 660 in 1953, the portions of the area involved were roughly similar).

BREEDING GROUND SURVEYS - QUEBEC AND LABRADOR -- 1953

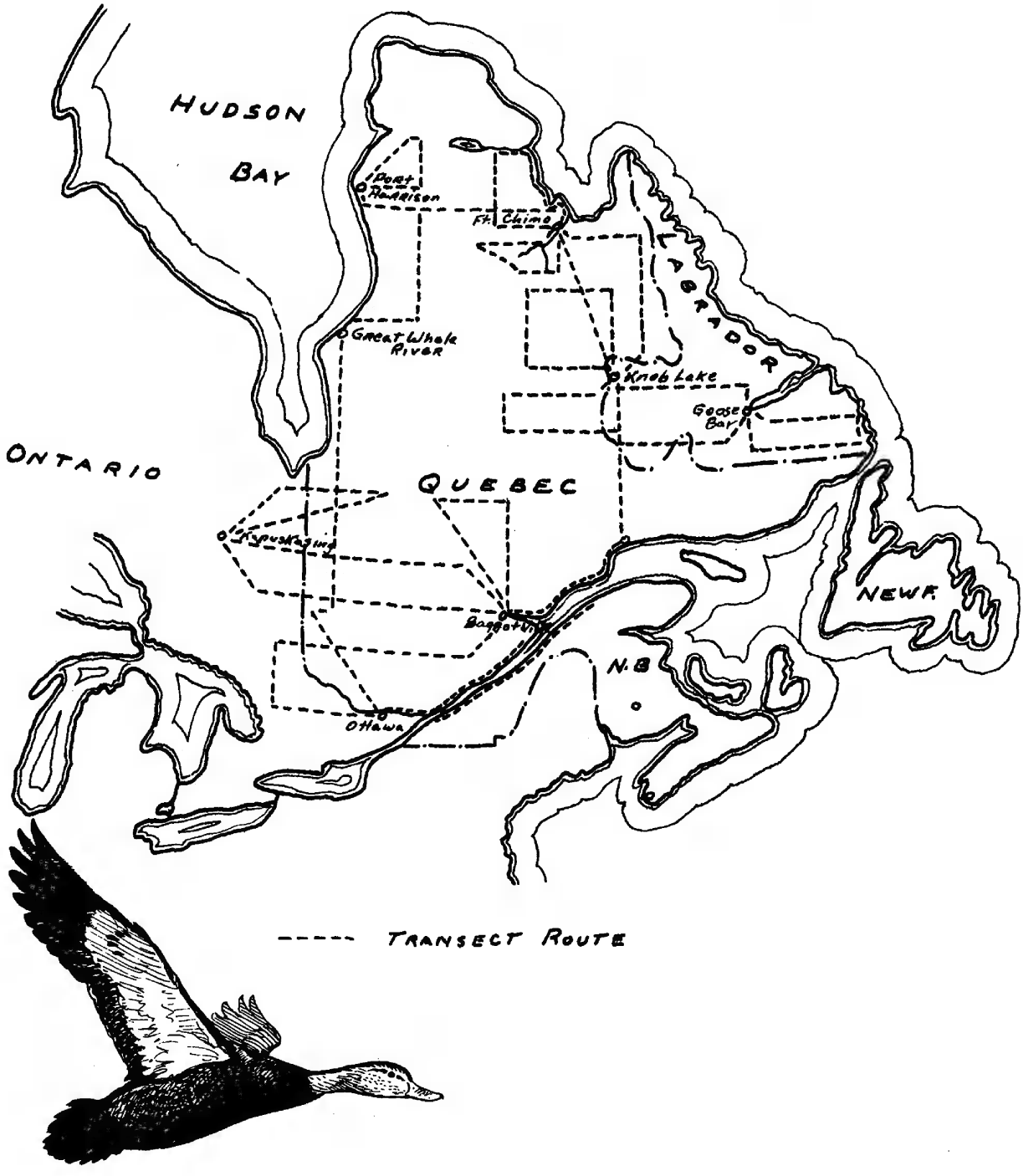

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Table I. - Index to the Number of Pairs, Singles, Grouped and Total Birds Observed in Quebec and Labrador 1952 and 1953

Species	Pairs		1952 Singles		1953 Singles		Grouped Birds		TOTAL		Percent Change
	1952	1953	Number	%*	Number	%*	1952	1953	1952	1953	
Black Duck	27,496	42,429	26,735	22	31,976	16	39,577	86,690	148,039	235,500	+ 59
Goldeneye	15,665	25,106	35,954	43	5,226	6	16,517	38,659	119,755	99,323	- 17
Ringneck	1,249	-	2,125	36	443	-	1,262	-	8,010	886	- 89
Scaup	4,082	23,165	13,077	42	4,212	7	9,796	7,371	44,114	62,125	+ 41
G-w. Teal	1,224	-	3,150	56	-	-	-	-	8,748	-	--
Unidentified	11,154	7,204	22,864	25	10,419	12	47,970	64,884	116,006	100,130	- 14
Sub-Total	60,870	97,904	103,905	30	52,276	12	115,122	197,604	444,672	497,964	+ 12
Merganser	37,962	109,846	82,501	37	74,337	17	62,248	132,681	303,174	501,047	+ 65
Scoter	1,458	31,925	408	7	5,791	4	2,857	80,512	6,589	155,944	+2265
Eider	7,062	1,053	-	0	526	8	9,630	4,212	23,754	7,370	- 69
Old Squaw	1,283	419	1,050	13	838	50	4,205	-	8,871	2,514	- 72
Total Ducks	108,635	241,147	187,864	31	133,768	13	194,062	415,009	787,060	1,164,839	+ 48
Canada Geese	27,322	32,679	19,490	8	16,740	6	162,033	216,785	255,657	315,623	+ 23

* Proportion of individual birds observed.

Table II. - Waterfowl Breeding Population Index by Stratum - Quebec and Labrador -- 1952 and 1953

	STRATUM									
	Boreal Mixed		Main Boreal		Open Boreal & Forest Tundra		Tundra		Total	
	1952	1953	1952	1953	1952	1953	1952	1953	1952	1953
Square Miles in Stratum	29,780		180,820		379,180		117,480		707,260	
Species										
Black Duck	10,774	12,763	75,271	71,884	49,796	143,732	12,198	7,121	148,039	235,500
Goldeneye	6,949	5,236	50,460	17,747	46,938	76,340	15,408	-	119,755	99,323
Ringneck	-	-	4,626	886	816	-	2,568	-	8,010	886
Scaup	-	-	840	-	34,286	62,125	8,988	-	44,114	62,125
G-w. Teal	-	-	-	-	4,896	-	3,852	-	8,748	-
Unidentified	5,458	3,271	30,698	20,855	52,245	54,227	27,605	21,777	116,006	100,130
Sub-Total	23,181	21,270	161,895	111,372	188,977	336,424	70,619	28,898	444,672	497,964
Merganser	8,686	27,488	149,281	256,475	125,305	209,544	19,902	7,540	303,174	501,047
Scoter	-	-	-	51,915	5,305	103,191	1,284	838	6,589	155,944
Eider	-	-	-	-	-	7,370	23,754	-	23,754	7,370
Old Squaw	-	-	4,205	-	816	-	3,850	2,514	8,871	2,514
Total	31,867	48,758	315,381	419,762	320,403	656,529	119,409	39,790	787,060	1,164,839
Canada Goose	-	-	27,332	2,219	44,081	115,301	184,244	198,103	255,657	315,623

Table III. - Number of Birds Observed Along Shorelines During Breeding Population Surveys - Quebec to Labrador -- 1952 & 1953

Species	No. Birds		Birds Per Linear Mile*	
	1952	1953	1952	1953
Black Duck	8,963	4,905	5.79	7.44
Goldeneye	1,148	356	.74	.54
Ringneck	40	382	.02	.58
Scaup	454	671	.29	1.02
G-w. Teal	165	23	.11	.03
B-w. Teal	93	12	.06	.02
Wood Duck	2	10	tr.	.02
Pintail	576	41	.37	.06
Mallard	24	132	.01	.20
Sub-Total	11,465	6,532	7.40	9.91
Merganser	1,491	918	.96	1.39
Scoter	11,552	13,844	7.46	21.00
Eider	4,197	2,767	2.71	4.20
Old Squaw	12	-	tr.	-
Unidentified	408	255	.26	.39
Total Ducks	29,125	24,316	18.80	36.89
Canada Geese	5,862	490	3.78	.74
Snow Geese	9,051	25,500	**	**
Blue Geese	25	-	**	-
Brant	941	3,838	.61	5.82

*Mileage in 1952 was 1,550 and in 1953 was 660.
**Found all in one place.

These data are difficult to interpret, inasmuch as it is apparent that the birds do not represent breeding populations along the shorelines where they were found, except possibly for the eiders. The number of most species except eider decrease practically to zero as the breeding season progresses, indicating that many of the birds may simply be waiting for more northern waters to open before moving out.

Production Survey

A survey to measure relative brood production was conducted for the first time during the summer of 1953. The dates of the survey were July 3 to 24. Although somewhat experimental in nature, 6,300 miles of transect were flown. The sample was scattered throughout the region, except as limited by gasoline and adequate maps.

As broods were observed under suitable conditions a record was made of the age class of the brood and the number of ducklings. Also, an attempt was made to determine the species. Of these data it was the opinion of the observers that only the information regarding the number of broods, age class, and number of ducklings per brood were usable. These data are summarized in Tables IV and V. Species

Table IV. - Duck Brood Production Indices - Quebec and Labrador -- 1953

	STRATA				
	Boreal Mixed	Main Boreal	Open Boreal & Forest Tundra	Tundra	Total
CLASS I					
No. Broods	-	1,166	7,360	-	8,526
Av. Size	-	5.00	4.58	-	4.64
No. Young	-	5,830	33,709	-	39,539
CLASS II					
No. Broods	1,874	4,666	27,969	-	34,509
Av. Size	4.80	6.58	5.05	-	5.24
No. Young	8,995	30,702	141,243	-	180,940
CLASS III					
No. Broods	1,071	5,833	2,944	-	9,848
Av. Size	6.00	6.33	5.00	-	5.90
No. Young	6,426	36,923	14,720	-	58,069
UNDETERMINED CLASS					
No. Broods	268	5,055	4,907	-	10,230
Av. Size	5.23	6.30	4.50	-	5.40
No. Young	1,402	31,846	22,082	-	55,330
TOTAL					
No. Broods	3,213	16,720	43,180	-	63,113
Av. Size	5.24	6.30	4.90	-	5.29
No. Young	16,823	105,301	211,754	-	333,878

Table V. - Goose Brood Production Index - Quebec and Labrador -- 1953

	STRATA				
	Boreal Mixed	Main Boreal	Open Boreal & Forest Tundra	Tundra	Total
CLASS I					
No. Broods	-	-	-	2,072	2,072
Av. Size	-	-	-	2.25	2.25
No. Young	-	-	-	4,662	4,662
CLASS II					
No. Broods			4,416	7,253	11,669
Av. Size	-	-	2.56	2.78	2.70
No. Young	-	-	11,305	20,163	31,468
UNDETERMINED CLASS					
No. Broods	-	-	981	1,554	2,535
Av. Size	-	-	3.00	2.67	2.80
No. Young	-	-	2,943	4,149	7,092
TOTAL					
No. Broods	-	-	5,397	10,879	16,276
Av. Size	-	-	2.64	2.66	2.65
No. Young	-	-	14,248	28,974	43,222

identification of a female with a brood is difficult from the air, except in the very best of conditions, and it seems likely that the females of some species are more easily identified than others. The following is a species break-down of the 158 duck broods observed on over-land transects.

Table VI. - Species Composition of Duck Broods Observed - Quebec and Labrador

Species	Number of Broods	Percent
Black Ducks	47	30
Goldeneye	3	2
Merganser	4	3
Scoter	7	4
Unidentified	97	61
Total	158	100

This species composition does not agree in any respect with the species composition of the breeding population, and it seems likely that either there is a lack of ability to identify certain species, or there is wrong identification involved in these data.

In addition to the over-land transects, a total of 682 miles of shoreline counts were made. One count was taken along the north shore of the St. Lawrence River between Montreal and Seven Islands, and the second was made along the west shore of Ungava Bay between Fort Chimo and the Payne River. Waterfowl were observed as follows:

Table VII. - Waterfowl Observed Along Shorelines in Quebec during July 1953

Species	Number of Birds	Birds Per Linear Mile	Number Broods
Black Duck	712	1.04	4
Goldeneye	744	1.09	-
Mallard	12	.02	-
B-w. Teal	47	.07	-
G-w. Teal	25	.04	-
Ringneck	24	.04	-
Pintail	31	.05	-
Merganser	88	.13	-
Eider	3,887	5.70	72*
Scoter	657	.96	-
Unidentified	2,601	3.81	4
Old Squaw	77	.11	-
Total Ducks	8,905	13.05	80
Canada Geese	264	.39	4

*Among the 72 "broods" of eider, were 1,737 young. Therefore, 72 is indicative of groups rather than broods.

In view of the fact that a brood survey was not conducted during the summer of 1952, there is no means of judging whether the data collected during the summer of 1953 represented a change over the previous year or not. Also, there is no means of judging whether the data represented either above or below average conditions for the region. However, it is of interest to note that the distribution of the broods observed, both ducks and geese, did not correspond very well with the distribution of the breeding population observed during May. The brood distribution seemed quite spotty in contrast to the rather even distribution of breeders. For example, there seemed to be a rather narrow band of habitat beginning just south of Fort Chimo and running generally toward Knob Lake in which broods seemed quite plentiful. Some transects which crossed this band averaged nearly .5 of a brood per square mile. In most of the remainder of the region, duck broods were very thinly distributed. It is worthy of note that no duck broods were recorded in the tundra habitat type. A number of goose broods were recorded in tundra, particularly in the vicinity of Port Harrison. It may have been that duck broods had not yet appeared at the time of the survey, although it is doubtful if this is the explanation. It seems possible that the brood distribution observed in 1953 may not have been normal. Weather, or some other factor may have reduced production in all but a few rather restricted areas.

Summary

Weather and water appeared to be normal, although there is little understanding of the climatological factors which affect waterfowl production in Quebec and Labrador. The breeding population of both ducks and Canada geese increased somewhat over 1952. Production may have been normal for the region, but due to the spotty distribution of the broods observed, there is reason to believe that production may have been below normal in some portions of the region.

WATERFOWL BREEDING GROUND SURVEY IN THE PROVINCE OF QUEBEC, 1953

Louis Lemieux

The breeding ground survey was conducted for the fifth consecutive year in the Province of Quebec in 1953, and the brood survey, initiated in 1951, was repeated in 1952 and 1953.

The breeding ground survey was carried out by Messrs. R. D. Harris and Louis Lemieux, both of the Canadian Wildlife Service, and Clement Delisle, of the Quebec Department of Game and Fisheries. The following areas were surveyed: Lochaber Bay and Carillon Island and Bay, on the Ottawa River; the west end of Lake St. Peter; the south shore of the St. Lawrence River, from Montmagny to Matane. The survey was made from May 6 to May 11.

The brood survey was made by Messrs Louis Lemieux, Canadian Wildlife Service, and Gaston Moisan, Quebec Department of Game and Fisheries, The areas studied were the west end of Lake St. Peter, and the south shore of the St. Lawrence River from Montmagny to Matane. The brood survey was conducted from July 4 to July 8.

All areas surveyed have been described in past reports.

Climatic Conditions

Spring was normal in southern Quebec, and set in on approximately the same dates as in 1952. Water level was high at the time the breeding ground survey was made, and normal at the time the brood survey was conducted. Migration dates were normal in 1953. Conditions appeared favourable for nesting.

Survey Methods

The areas studied were covered by automobile, outboard motorboat and on foot.

Data

The data collected appear in table form at the end of this report. The results of the breeding ground survey and of the brood survey are discussed separately.

Breeding Ground Survey

It has been mentioned in past reports that the results of the breeding ground survey in Quebec are not truly significant because most of the waterfowl observed are migrants on their way to nesting grounds. Exception is made for the south shore of the St. Lawrence River, where eiders nest in abundance. No area has been found yet in this Province where waterfowl other than eiders concentrate to nest.

The results of this year's survey show, however, a general increase in population for most species of waterfowl. Approximately 95 percent of the waterfowl seen when the survey was made were paired.

Brood Survey

Only one brood was seen in Lake St. Peter; four were seen in the same area last year. In view of these insignificant results, the survey will not be repeated in Lake St. Peter in the future.

Twice the number of eider broods observed in 1952 were seen in 1953. The ratio "young per adult" is however somewhat smaller than last year (3.3 against 3.8).

As was remarked in last year's report, the ratio "young per adult" appears to be more significant than the ratio "young per brood" for eiders, because the broods of this species mix together.

These results show a smaller nesting success for eiders in this Province for 1953.

Quebec Waterfowl Breeding Ground Survey - 1953

LOCHABER Bay

Species	1953	1952
Goldeneye	79	0
Scaup	58	0
Black duck	36	10
Bufflehead	11	1
Old squaw	5	0
Wood duck	3	0
Mallard	1	3
Pintail	0	2
Ringneck	0	20
Baldpate	0	1
Unidentified	18	0
Total	211	37

CARILLON ISLAND AND BAY

Species	1953	1952
Scaup	600	2
Goldeneye	129	2
Canada geese	16	0
Black duck	13	0
Brant	12	0
Merganser	9	0
Bufflehead	3	0
Wood duck	2	0
Mallard	0	2
Blue-winged teal	0	1
Unidentified	21	0
Total	805	7

WEST END OF LAKE ST. PETER

Species	1953	1952
Scaup	1,837	171
Goldeneye	374	37
Black duck	289	261
Blue-winged teal	42	32
Pintail	20	14
Wood duck	6	0
Mallard	3	13
Green-winged teal	2	10
Shoveler	1	4
Unidentified	28	0
Bufflehead	0	1
Total	2,602	543

MONTMAGNY TO RIVIERE-DU-LOUP

Species	1953	1952
Canada geese	839	1,052
Brant	202	912
Black duck	29	86
Eider	26	63
Mallard	0	1
Scaup	0	30
Pintail	0	28
Green-winged teal	0	6
Surf scoter	0	6
Goldeneye	0	4
Total	1,096	2,188

Quebec Waterfowl Breeding Ground Survey - 1953 (continued)

RIVIERE-DU-LOUP TO MATANE

Species	1953	1952
Eider	2,147	1,713
Brant	1,542	2,051
Canada geese	585	142
Surf scoter	489	171
Goldeneye	153	160
Black duck	58	17
Red-breasted merganser	49	0
Old squaw	47	54
American scoter	37	0
White-winged scoter	11	0
American merganser	2	0
Scaup	3	1
Unidentified	7	0
Green-winged teal	0	5
Total	5,130	4,314

Total for whole area:	1953	1952
	6,226	6,502

Total for Species

Species	1953	1952
Scaup	2,528	204
Eider	2,173	1,776
Brant	1,756	2,693
Canada geese	1,440	1,194
Goldeneye	735	223
Surf scoter	489	178
Black duck	425	388
Old squaw	52	54
Red-breasted merganser	49	26
Blue-winged teal	42	33
American scoter	37	0
Pintail	20	44
Bufflehead	14	3
White-winged scoter	11	0
Wood duck	11	6
American merganser	11	131
Mallard	4	17
Green-winged teal	2	21
Shoveler	1	4
Unidentified	74	0
Ringneck	0	21
Baldpate	0	1
Total	9,874	7,017

Brood Survey, Quebec, 1953 -- South Shore of St. Lawrence River

	Broods	Young	Adults
Montmagny to Riviere-du-Loup	4	12	4
Riviere-du-Loup to Sainte Flavie	272	1,453	437
Sainte Flavie to Matane	46	411	94
Total - Montmagny to Matane	322	1,876	535

	1953	1952
Ratio young per adult	3.3	3.8

WATERFOWL BREEDING GROUND STUDIES IN THE MARITIME PROVINCES

George F. Boyer

Weather and Water Conditions

The winter of 1952-53 was exceptionally mild and while rainfall was much above normal there was very little snow. Mean temperatures remained consistently above normal. The winter ended with a mild, wet March.

April was wet with above normal temperatures and although May began sunny and warm the last two weeks were cloudy and cool. May marked the first time in six months when the mean temperature fell below normal. The rainy, cool weather continued into June but that month ended sunny and warm. The first three weeks of July were hot and sunny with very little rain, but a period of wet, cool weather began on July 21 and continued until the time of writing (July 24).

The run-off was light owing to the mild winter and there were no subsequent fluctuations of water levels during the following months. Spring started early, and, in spite of periods of cool, wet weather, new vegetation appeared a week to ten days earlier than last year. Observations during the summer survey indicate that the crop of aquatic vegetation, including waterfowl food and cover plants, is good.

Spring migrants such as geese, brant and scaup ducks passed through the Maritimes early this year and slight increases in the first two species were noted and reported by competent observers.

Two broods of well-grown black ducks were seen by Crissey and Bain in western Nova Scotia on May 16, during the aerial survey. From these and other observations it would appear that broods were hatched slightly earlier than in the preceding two years.

Ground checks and aerial brood survey results point to success of early broods. Young birds appeared to make up a good part of the flying population during mid-July. It is thought that weather conditions should be favorable for late nesters but lack of present brood information prevents reliable comments.

Breeding Population Trends

Aerial coverage carried out by W. F. Crissey and R. H. Bain provides the sole source of data for the breeding population trends. This work was part of a larger survey covering other parts of eastern Canada and it is felt by the writer that better evaluation can be obtained by taking the survey as a whole than by breaking it down into its various components. Areas covered in the Maritimes were changed from last year and reliable comparison is difficult.

During the period May 12 to May 17, inclusive, various types of habitat including 215 square miles of low-production, mixed boreal forest in New Brunswick and Nova Scotia, and 1,200 linear miles of tidal and non-tidal shoreline in the three Maritime Provinces were sampled. In addition, the transects covering 12.5 percent of the Northeastern Wildlife Station's study area below Fredericton, New Brunswick were re-run.

It is anticipated that the present sampling system will be used, and the same areas covered, for a number of years, thus facilitating the assessment of breeding trends.

Comparison with the 1952 results is difficult as only about half the shoreline counts can be utilized and most of the transect data come from very poor habitat. More information on the numbers of migrants belonging to species also nesting in the region is needed. The large concentrations of black ducks off the Nova Scotia coast (already mentioned by Addy) need further study before reliable estimates of the breeding population can be made.

The following table gives an estimation of breeding trends for the past two years for comparable areas:

Table I. - Breeding Population Trends, 1952-1953

Type of Coverage	Black Ducks		Total Game Ducks	
	1952	1953	1952	1953
(Birds per square Mile)				
Inland Transects - boreal Forest	0.94	0.84	1.48	1.14
Northeastern Wildlife Station Study Area	43.67	52.53	84.00	104.53
(Birds per linear mile)				
Shoreline Counts	4.00	6.10	5.24	7.44

Success of the Season

The summer survey was carried out by members of the Canadian Wildlife Service.

Areas covered by air in 1952 were flown over again this year. In addition, the spring transects in the mixed boreal forest were re-run and a few marsh areas and additional shoreline were surveyed.

The greater part of the aerial work was done with a Fleet Canuck, a small two-seater highwing monoplane ideally suited for this type of work. Observations in Prince Edward Island and Nova Scotia were made by Brian C. Carter, Dominion Wildlife Officer. In New Brunswick aerial observations were carried out by the writer. Part of the New Brunswick inland transects were run in an Anson supplied by the New Brunswick Forest Service. Most of the areas were surveyed from two to three weeks later than last year. It is felt that this should give better results although it might show a lower count of non-flying broods of early nesting species.

A comparison of the aerial brood counts for 1952 and 1953 is shown in Table II. The drop in number of black duck broods can probably be explained by the early 1953 season and the later survey dates this year. From ground observations it is known that many young blacks were awing during the time of the 1953 survey, and consequently may have been included in the "adult" population. Aquatic vegetation was very lush this year and the broods were better able to escape detection. Summer populations per square (or linear) mile are shown in Table III.

Table II. - Comparable Aerial Brood Survey Data - 1952-1953

	1952	1953
Black Duck		
Adult	875	1,516
Brood	60	46
Blue-winged teal		
Adult	64	68
Brood	1	-
Ring-necked Duck		
Adult	86	116
Brood	6	4
Goldeneye		
Adult	54	66
Brood	1	9
Others		
Adult	33	14
Brood	7	-
Total Game Ducks		
Adult	1,112	1,780
Brood	75	59

NB - This table represents total aerial observations made on comparable areas for 1952 and 1953. Time does not permit a full break-down into numbers per unit area in all types of habitat covered, particularly in the larger marsh areas such as Hampton (fresh), Musquash (salt), in New Brunswick and Yarmouth County (salt) in Nova Scotia where total coverages were made. Where a break-down has been possible results are shown in Table III.

Table III. - Summer Populations Per Unit Area, 1953

Types of Coverage (per Square Mile)	Black Ducks		Total Game Ducks	
	Adults	Broods*	Adults	Broods*
Inland Transects, Boreal Forest	0.24	0.02	0.24	0.02
Inland Transects, Major **	3.35	0.27	5.73	0.33
Production Areas ***	1.13	0.35	2.60	0.45
(per Linear Mile)				
Shoreline Counts - Tidal	1.32	0.04 -	1.44	0.04 +
Non-Tidal	0.66	0.04	1.27	0.07

* Adults include all birds not definitely identified as broods, also include the females accompanying broods. Broods refer to numbers of broods seen. Because many complete broods were not seen the number of ducklings was not integrated into the population figures. Number of ducklings may be computed from the table on average brood sizes.

** Northeastern Wildlife Station Study Area.

*** New Brunswick-Nova Scotia Border Area.

A total of 95 complete broods was seen during the aerial and ground survey work. Brood data for 1953 and 1952 are presented in Table IV.

Table IV. - Average Number per Brood by Age Class - 1952 and 1953

Age Class		Black Duck		Goldeneye		Ringneck	
		Number Broods	Av. Size	Number Broods	Av. Size	Number Broods	Av. Size
Class I,	1952	15	6.7	-	-	11	7.2
	1953	6	6.8	1	7.0	14	8.0
Class II,	1952	34	6.8	-	-	12	6.8
	1953	39	5.5	6	8.0	-	-
Class III,	1952	22	7.2	1	8.0	-	-
	1953	24	4.9	5	4.4	-	-
Total	1952	71	6.9	1	8.0	23	7.0
	1953	69	5.4	12	6.4	14	8.0

Black duck brood sizes appear to have taken a considerable drop from last year which appeared to show exceptionally high production as Mr. Addy's figures for 1951 show Class I - 6.5; Class II - 6.2; Class III - 5.4, and all Classes - 5.9, for black ducks, which more closely approaches this year's figures.

Ground Survey Work

Approximately 100 hours of ground survey work were done in New Brunswick and Nova Scotia during the period June 9 to July 31. This work was carried out by canoe and outboard, and on foot with a Labrador retriever.

Ground survey work was designed to obtain data on brood sizes and ages, to locate areas suitable for future comparative counts and comparison of aerial and ground surveys, and to conduct experimental banding with the aid of a dog.

As practically all this work was done in conjunction with other duties by the writer alone, it was not possible to sample many large areas for direct comparison with the aerial survey. However, three areas, where it is felt an accurate comparison could be made, are outlined in Table V.

Banding

The banding data listed in this report cover the period June 9 to September 30. Banding of flightless birds, using a Labrador retriever, was carried out as an adjunct to the ground survey work from June 9 to July 26. A small number of traps was operated for a week in late July and again from September 15 to 30 in Nova Scotia - New Brunswick border area.

Table V. - Comparison of Air - Ground Data

	Hampton Marsh						Musquash Marsh				Red Head Marsh			
	Air		Ground		Ground		Air		Ground		Air		Ground	
Date	July 18		July 9-10		July 30-31		July 18		July 16		July 18		July 17	
Time Taken	30 min		10hr 15min		7hr 10min		15 min		5hr 35min		4 min		3hr 30min	
Species	Ad	Br	Ad	Br	Ad	Br	Ad	Br	Ad	Br	Ad	Br	Ad	Br
Black	196	-	65	6	124	7	27	1	4	4	39	1	41	6
Pintail	-	-	-	-	-	-	-	-	-	-	-	-	4	-
Baldpate	-	-	-	-	-	-	-	-	-	-	7	-	5	-
B-w teal	-	-	3	-	6	-	-	-	-	-	-	-	1	1
G-w teal	-	-	-	-	-	2	-	-	2	-	5	-	12	1
Merganser	2	1	-	-	-	-	7	-	-	-	-	-	-	-
Golden-eye	41	4	3	10	8	2	-	-	-	-	-	-	-	-
Wood duck	-	-	5	-	7	-	-	-	-	-	-	-	-	-
Ring-neck	49	-	116	4	24	5	-	-	-	-	-	-	-	-
Unident.	1	-	-	1	4	2	1	-	-	-	-	-	-	-
Total	289	5	192	21	173	18	35	1	6	4	51	1	63	8

Table VI. - Tabulation of Banding Data - with aid of Labrador Retriever

Species	Adult		Immature		Immature	Total
	Male	Female	Male	Female	Not Sexed	
Black Duck	-	4	25	34	1	64
Pintail	-	-	-	1	-	1
B-w. Teal	-	-	-	1	-	1
Wood Duck	2	-	-	-	-	2
Total	2*	4*	25	36	1	68

*Flightless moulters.

Trapping

Species	Adult		Immature		Not Sexed or Aged	Total
	Male	Female	Male	Female		
Black Duck	3	8	26	7	1	45
Pintail	-	-	2	-	-	2
B-w. Teal	3	2	10	25	-	40
Total	6	10	38	32	1	87

In addition to the foregoing, 88 mallards reared by Dr. G. M. McFarlane of Sackville, New Brunswick were banded and released in two marshes in the New Brunswick - Nova Scotia border area on August 19, 1953. Fifty-nine of these were birds of the year and the remainder were born in 1952. Four of these were shot on the opening day of the hunting season and were reported to be in good condition.

WATERFOWL BREEDING GROUND SURVEY IN THE ST. JOHN ESTUARY, 1953

Bruce S. Wright

Introduction

This is the 9th consecutive year of the survey, and as the method has not changed, all results are comparable.

Phenology

The break-up of the river at Fredericton in 1953 occurred 20 days earlier than the 126-year average. The ice began to move on March 28, but black ducks had arrived 2 days before, which was 9 days later than in 1952. The 2 teals and wood ducks arrived on schedule, but the ringnecks were 14 days earlier than last year, arriving on the study area on March 31. Mallards were noted on April 10, compared with May 3 last year. It appears, therefore, that the early arrivals were either on schedule or a little late, but the late arrivals were ahead of schedule.

The peak flood occurred on April 3, compared with a 5-year average of April 17. Little fluctuation was noted during the normal period of drop-off, but on July 29 there was a sudden rise of over 2 feet which probably washed out some ringneck nests.

May was a very wet month, but June and July were dry and hot and the water level fell rapidly. By the end of the census on August 17 the total miles of slough shoreline on the study area had shrunk from 108.5 miles in 1952 to 74.4 miles in 1953. This greatly affected the number of ducks using the area in the latter part of the summer.

Hatching Success and Brood Survival

Table I shows the hatching success and brood survival during the 1953 breeding season compared with 1952, and with the 1945-53 average. There was a noticeable decrease in breeding waterfowl on the study area in 1953. A total of 150 broods were found in the course of the study in 1952, but only 115 broods were found in 1953 with the same amount of fieldwork. The break-down by species is shown in the table.

A definite decrease in well-grown broods was apparent in all species except the blue-winged teal. The blue-winged teals held up to the 8-year average, but all the other breeding species were well below. No great change in brood size was noted for the older broods, but among the downy ducklings the blue-winged teals again showed considerably larger than average broods and the change from 2.8 broods per year on the area as an average of the past eight years to 12 broods in 1953 is considered significant.

The wood duck was the only other species in which a larger than average number of young broods was found. The black duck, the principal species of the region, had a poor year in the estuary of the St. John in 1953. Considerably fewer than average broods were found, although brood survival appeared unaffected.

Table I. - Hatching Success and Brood Survival - 1953

Species	Class I		Class II		Class III		Remarks
	No. Broods	Dkls. / Brood	No. Broods	Dkls. / Brood	No. Broods	Dkls. / Brood	
Black Ducks							
Av. 45-53	16.1	7.7	11.1	6.2	14.8	6.9	
1952	8	8.0	12	7.7	17	7.6	
1953	8	7.5	9	6.1	7	7.0	
B-w. Teal							*
Av. 45-53	2.8	6.5	3.6	6.2	4.5*	6.9*	8 yrs. only
1952	4	6.0	3	7.7	5	8.2	
1953	12	9.2	9	6.3	4	5.5	
G-w. Teal							
Av. 45-53	2.3*	7.4*	2.6+	6.6+	4.2°	5.9°	* 7 yrs. only
1952	-	-	3	8.7	4	5.8	+ 8 " "
1953	-	-	-	-	-	-	° 6 " "
Wood Duck							
Av. 45-53	7.4*	6.4*	9.1	6.0	7.5	5.6	* 8 yrs. only
1952	3	8.7	12	6.5	6	5.8	
1953	12	8.2	3	7.0	3	5.7	
Ringneck							
Av. 45-53	19.2	7.0	14.7	6.4	6.4*	5.5*	*8 yrs. only
1952	11	8.2	16	6.4	1	4.0	
1953	18	7.9	8	5.4	1	5.0	
Goldeneye							
Av. 45-53	21.6*	6.2*	9.3	4.9	8.3	4.6	*8 yrs. only
1952	18	6.7	15	5.8	12	4.2	
1953	14	7.0	5	5.4	4	5.8	

Population Changes from 1952

Table II shows the changes in total waterfowl population on the study area since 1952. There is an over-all decrease of 40 percent from last year at the end of the survey on August 17. This is considered to be mainly due to the low water levels which has dried up most of the sloughs.

Table II. - Population Changes from 1952

Species	Total Population 1952	Total Population 1953	Percent Increase or Decrease from 1952
Black Ducks	1,405	738	- 48
B-w. Teal	160	363	+127
Wood Duck	333	122	- 63
Goldeneye	127	79	- 38
Ringneck	210	65	- 69
G-w. Teal	78	20	- 74
Mallard	3	2	--
Pintail	-	2	--
Total	2,316	1,391	- 40

Species Composition on the Study Area

The greatest change in species composition is noted in the blue-winged teal. This species rose from 7 percent of the population in 1952 to 26 percent in 1953, and the number of broods found show that this is an increase in breeding population and is not caused by early migrants. The black duck still remains the mainstay of the population with 53 percent of the total, a drop of 7 percent from 1952. Wood ducks decreased from 14 percent to 9 percent and ringnecks decreased from 9 percent to 5 percent. The other species showed no significant changes in their relative positions in the breeding population.

Table III. - Species Trends since 1945

Species	Percent Increase or Decrease from 1945							
	1946	1947	1948	1949	1950	1951	1952	1953
Black Ducks	- 49	- 9	- 24	+ 84	+111	+ 58	+128	+ 20
B-w. Teal	- 88	- 87	- 70	- 31	- 44	- 39	- 58	- 5
Wood Duck	- 80	- 68	+ 16	+ 82	+ 23	- 25	+ 7	- 61
Goldeneye	- 63	+189	+ 85	- 41	- 5	+ 81	+140	+ 15
Ringneck	+ 3	- 49	- 18	+ 11	+ 11	- 21	- 11	- 73
G-w. Teal	- 14	- 78	- 74	+ 33	+ 23	+ 29	- 37	- 83
Total	- 54	- 42	- 26	+ 43	+ 37	+ 8	+ 34	- 20

Black ducks and goldeneyes are still above the 1945 level, but all other species are below. The total population is smaller this year than in any year since 1948. Again this is probably the result of water conditions, and may have no bearing on the fall hunting when the migration is under way. If the fall rains bring the river up to its normal level the supply of wildrice and other choice foods should ensure a good crop of migrants for the hunters, but those who are depending on the local ducks at the beginning of the season may be disappointed.

Conclusion

The 1953 breeding season in the St. John estuary was characterized by a very wet month of May followed by very dry and hot months of June and July. The river fell rapidly, and with the exception of one rise in late July which may have flooded some ringneck nests, there should have been negligible food losses. The river was so low by mid-August that most of the sloughs were dry, and the census shows a big decrease in the numbers of ducks using the area.

The only species to show a significant increase was the blue-winged teal, which bred in greater numbers in the estuary this year than in any of the previous nine years. The other breeding species showed large decreases.

The prospects for the hunting season will depend entirely upon the water levels. If the rains are late and the sloughs remain dry well into the fall, the area available to ducks in the estuary will be considerably reduced and the early season shooting can be expected to be below average. If the dry period ends before the shooting season, normal conditions may be expected with migrants, but local birds will be in short supply.

WATERFOWL BREEDING GROUND SURVEY IN NEWFOUNDLAND

Leslie M. Tuck

Introduction

The objective of this survey was to examine a few small areas of waterfowl habitat in the island of Newfoundland in order to determine the breeding status of the species found there.

A total of 14 square miles was examined on foot during the period from May 9 to June 25. Eight square miles of this total area was in the Codroy Valley on the west coast of the island where the only sizeable stands of Typha latifolia and Ruppia martima are known. The most common breeding waterfowl in this locality was Mergus serrator which fed extensively in the estuaries. Small groups of unattached black ducks indicated the importance of this locality to migrating waterfowl. Other areas examined were representative samples of the island which had also been examined on foot during 1952.

Methods

At Swift Current and on the Southern Shore a canoe was used to some extent. Other areas were covered by foot.

Weather and Water Conditions

Newfoundland had a very mild winter and black ducks, although not wintering in any large numbers, were generally distributed and recorded from as far north as Cartwright, Labrador. Spring was phenologically normal except that black ducks may have nested rather early since broods were encountered from the middle of May on, and at least one brood had hatched by May 2. Because of the physical features of the island, rainfall and run-off remain fairly constant and there was no departure from the norm this year.

Results of Survey

The 14 square miles surveyed during the specified period yielded 181 waterfowl, assumed to be breeding. These are listed in Table II. Birds assumed to be late migrants or non-breeders are listed in Table I.

Evaluation of Data

Owing to the small size of the study areas, these data are not necessarily representative of the island. Several of these areas are chosen for convenience and may be described as pockets of concentration and if the size of the area were doubled the total numbers of waterfowl observed would not be appreciably changed. Aerial coverage of large areas, such as was done last year, is more representative. Unfortunately, this year an aircraft could not be obtained. The general impression of observers and one retained by the writer from passing through numerous areas in which a count was not specifically taken was that there had been a marked increase in breeding black ducks this year. Teal and ring-necked ducks also indicated a more favourable breeding distribution.

Table I. - List of Non-Breeding Waterfowl in Areas During Survey

Species	Little Codroy (May 9 - 14)	Grand Codroy (May 12)	Gander (May 16-18)	Swift Current (June 6-7)	South Shore (June 25)
Canada Geese	4	9	-	9	3
Black Duck	33	6	-	-	-
Pintail	1	-	-	-	--
American Scoter	52	-	-	-	-
American Merganser	-	8	-	-	-
Red-breasted Merganser	24	73	-	-	-

Table II. - Waterfowl Breeding Populations - (Individuals)

Species	Little Codroy (May 9 - 14)	Grand Codroy (May 12)	Gander (May 16-18)	Swift Current (June 6-7)	South Shore (June 25)
Canada Geese	-	-	-	14	2
Black Duck	8	6	6	7	5
Green-winged teal	6	4	7	5	5
Ring-necked duck	1	-	5	-	4
Scaup sp.	-	-	-	-	6
American goldeneye	6	6	10	2	4
American Merganser	3	-	-	-	-
Red-breasted Merganser	14	34	-	3	8
Estimated Area in Square Miles	3	5	2	2	2
Density per Square Mile	12.7	10	14	15.5	17

Table III. - Waterfowl Densities per Square Mile by Species

Species	Little Codroy	Grand Codroy	Gander	Swift Current	Southern Shore
Canada Geese					
1953	0.0	0.0	0.0	4.0	1.0
1952	-	-	0.0	8.0	0.6
Black Duck					
1953	2.7	1.2	3.0	3.5	2.5
1952	-	-	2.5	4.3	4.5
Green-winged teal					
1953	2.0	0.8	3.5	2.5	2.5
1952	-	-	3.0	1.7	0.8
Ring-necked duck					
1953	0.3	0.0	2.5	0.0	2.0
1952	-	-	2.0	0.0	0.8
Scaup sp.					
1953	0.0	0.0	0.0	0.0	3.0
1952	-	-	0.0	0.0	1.2
American goldeneye					
1953	2.0	1.2	5.0	1.0	2.0
1952	-	-	4.0	0.0	0.8
American merganser					
1953	1.0	0.0	0.0	0.0	0.0
1952	-	-	0.0	0.0	0.0
Red-breasted merganser					
1953	4.7	6.8	0.0	1.5	4.0
1952	-	-	0.0	1.0	6.4

Table IV. - Broods Observed or Reported During Period **

Species	No. Broods	Total Young	Average Young per Brood
Canada Geese	10	49	4.9
Black Duck	14	101	7.2
Green-winged teal	5	42	8.4
Ring-necked Duck	2	16	8.0
Scaup sp.	1	11	11.0
Red-breasted Merganser	18	156	8.6

** Including localities outside of survey areas.

WATERFOWL BREEDING GROUND SURVEY IN OREGON

Chester E. Kebbe

Introduction

The 1953 waterfowl breeding ground survey represents the fifth consecutive year such a survey has been carried on in Oregon. Permanent samples are located in most waterfowl areas of the State, with the exception of Upper Klamath Lake area. Personnel are not assigned permanently to waterfowl investigation work, except biologists on three game management areas. The investigation work in the balance of the State is carried on by game biologists as one of their many and varied duties.

Methods of Sampling

The transect method of sampling by foot and by car was used on all areas. No aerial transects were run. The samples run are those which have been run in previous years. No attempt has been made to count or estimate total reproduction.

Weather and Water Conditions

The water conditions in southeastern Oregon, the major production area in the State, were ideal from the nesting standpoint. An abundance of water made considerably more nesting habitat available. The water during the spring months remained stable. In 1952 the increased run-off destroyed a large number of waterfowl nests.

The late spring, in which sunshiny days were the exception rather than the rule, had an effect on nesting. Both normal migration and nesting were two weeks later than past averages.

Breeding Population Trends

Increased water in the two major areas in eastern Oregon on which we have census samples made re-location of the samples necessary for foot and car sampling. However, in these two areas a noticeable increase in mallard and cinnamon teal reproduction was noted. No great change in reproduction of other species was recorded. The balance of samples are located in areas with little waterfowl habitat. Downward trends were noted in these but in view of the increased areas which became available through an abundance of water it is felt that the over-all production was comparable with that of 1952.

Success of the Season

The large marsh areas of eastern Oregon are the major waterfowl production sections in the State. These areas include Malheur Refuge, Warner Valley, Summer Lake and the Klamath Basin. In addition, there are numerous small marshes, potholes, lakes and streams, each of which has varying degrees of waterfowl reproduction. Table I gives the brood data for eastern Oregon.

Table I. - Average Brood Size by Age Classification in Eastern Oregon

Species	Females w/broods	Class I No. Broods	Class I No. Young	Class I Average Size	Class II No. Broods	Class II No. Young	Class II Average Size	Class III No. Broods	Class III No. Young	Class III Average Size
Mallard	161	50	375	7.5	59	432	7.3	72	510	7.1
Pintail	16	8	53	6.6	3	19	6.3	5	34	6.8
Cinnamon teal	50	41	265	6.5	8	54	6.7	1	12	12.0
Green-winged teal	3	1	3	3.0	2	9	4.5	-	-	-
Blue-winged teal	1	-	-	-	1	7	7.0	-	-	-
Gadwall	119	80	632	7.9	32	224	7.0	7	47	6.7
Redhead	130	31	222	7.2	69	442	6.4	32	198	6.2
Ruddy duck	43	36	230	6.4	7	51	7.3	-	-	-
Shoveler	9	8	58	7.2	1	5	5.0	-	-	-
Wood duck	1	-	-	-	1	3	3.0	-	-	-
Total ducks	533	255	1,838	7.2	183	1,246	6.8	117	801	6.8
Canada geese	69	26	122	4.7	18	92	5.1	25	116	4.6

Table II. - Average Brood Size by Age Classification in Western Oregon

Species	Females w/ broods	Class I No. Broods	Class I No. Young	Class I Average Size	Class II No. Broods	Class II No. Young	Class II Average Size	Class III No. Broods	Class III No. Young	Class III Average Size
Mallard	44	4	22	5.5	18	138	7.7	22	168	7.6
B-w. teal	3	-	-	-	3	17	5.7	-	-	-
Wood ducks	19	5	39	7.8	7	63	9.0	7	38	5.4
Total ducks	66	9	61	6.8	28	218	7.8	29	206	7.1
Canada geese	1	1	3	3.0	-	-	-	-	-	-

In western Oregon little waterfowl breeding takes place. The main breeding species being the mallard and wood duck. Occasional blue-winged teal broods are observed. Geese have never been recorded as breeding west of the Cascades until a transplant was made on Sauvie Island. Some reproduction is taking place there. Table II shows brood data for western Oregon.

Nesting Studies

A continuation of the nesting studies of the wood duck has been carried on at Sauvie Island. This is the fourth year of this project. Of interest is the fact that we have had approximately 80 percent usage of nest boxes each year since the first nests were put up. We had installed 25 nests the first year, a total of 50 the second, 80 the third and 200 the fourth year. Apparently these birds are increasing on the island but our census shows little change. This is probably due to the location of our samples and the secretive nature of the bird.

Banding

During the period of June 1 through September 30, 1953, a total of 838 ducks, 83 coot and 87 geese were banded. The adult female wood ducks were banded in nest boxes. A break-down shows the species and numbers.

Table III. - Waterfowl Banded in Oregon -- June 1 through September 30, 1953

Species	Adult Male	Immature Male	Adult Female	Immature Female	Unclassified	Total
Mallard	231	130	56	108	-	525
Pintail	32	65	27	43	-	167
Baldpate	-	1	-	-	-	1
G-w. teal	-	2	-	1	2	5
Gadwall	-	2	-	8	-	10
Redhead	-	-	-	1	14	15
Cinn. teal	-	14	1	9	38	62
Wood ducks	-	-	46	-	7	53
Total ducks	263	214	130	170	61	838
Canada geese	17	1	19	1	49	87
Coot	-	-	-	-	83	83

Summary

1. Excellent nesting success was apparent throughout the State on most species. Increased nesting was observed with mallards and cinnamon teal.

2. A late spring retarded nesting approximately two weeks from normal.

3. Nesting studies of the wood duck were continued.

4. A total of 838 ducks, 83 coot, and 87 Canada geese was banded between June 1, 1953 and September 30, 1953.

WATERFOWL BREEDING GROUND SURVEY IN CALIFORNIA, 1953

A. W. Miller, A. E. Naylor and Frank M. Kozlik*

Introduction

During the spring and early summer of 1953, the waterfowl breeding ground survey was conducted in essentially the same manner as in previous years throughout the principal waterfowl habitat of the State. By way of review it should be noted that under existing conditions the primary waterfowl production areas in California are in the northeast or "Great Basin" corner of the State, and in the Sacramento Valley.

The northeastern part of the State, including the Klamath Basin, contains numerous natural marshes and artificial water impoundments. The scattered distribution of these water areas with this great basin-type region makes it impractical to fly aerial transects. Instead, this entire area was given complete aerial coverage of all water and marsh areas to determine the total number of breeding waterfowl. To obtain further information on waterfowl production in this part of the State, a nesting study was conducted at Honey Lake Refuge.

The Sacramento Valley is devoted to intensive agriculture with only a remnant of the once vast marshlands remaining. These remaining marsh and overflow lands are largely in private ownership and are controlled primarily by private duck clubs. Coupled with these remnants of marshland, the culture of rice as a commercial crop is responsible for a large portion of the waterfowl raised in this valley. From late April through the middle of September, over 290,000 acres of shallow stabilized water in the form of contoured rice fields are available to nesting ducks. Before the rice grows too high, this area can be ideally covered by aerial transect flights. Later in the season, however, brood counting and fall population counts are difficult to accomplish due to the dense cover growth and the inaccessible nature of these areas on foot. In contrast to northeastern California where a variety of waterfowl species nest, the primary species meeting in the Sacramento Valley is the mallard.

The remainder of the waterfowl produced in California are raised in scattered sections of agricultural and marsh habitat including tidal saltmarshes, stream channels, and artificial impoundments. These areas include the Suisun marsh, Sacramento-San Joaquin River Delta, the Grasslands of the San Joaquin Valley and the North Bay. In many cases, production is high on these areas, but is limited in significance by the relatively small size of the area and the amount of water. Nesting surveys on these areas were carried on at Suisun marsh and in the Grasslands.

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* Other personnel of the Federal Aid in Wildlife Restoration Project California 30-R, namely William Anderson, Philip H. Arend, Burton D. Collins and Eldridge Hunt cooperated in this study. Credit is also due Paul E. Steel and Thomas Horn of the Tule Lake National Wildlife Refuge for the gathering of the data on that area.

Weather and Water Conditions

This year water conditions were again nearly ideal. Winter precipitation was sufficient to fill all the lakes and impoundments, some reservoirs were even higher than in 1952. In late January and throughout February and March the State experienced unseasonably mild weather. These indications of an early spring caused waterfowl to move north earlier than usual. In northeastern California, Canada geese showed signs of nesting by late February. However, in April the weather turned cold, and in May and June the temperatures were below average. These adverse weather conditions retarded duck nesting about two weeks later than normal.

Scope and Methods

Fundamentally the survey consists of an aerial census of the pairs of ducks present on the breeding grounds during the last half of May and the first half of June, assuming an even sex ratio. Production is based on the number of pairs found, the relative nesting success, and the average brood size on each area. The latter two factors require considerable ground work and it is not always possible to conduct such surveys on each unit every year. An attempt is made to keep the data current on major areas.

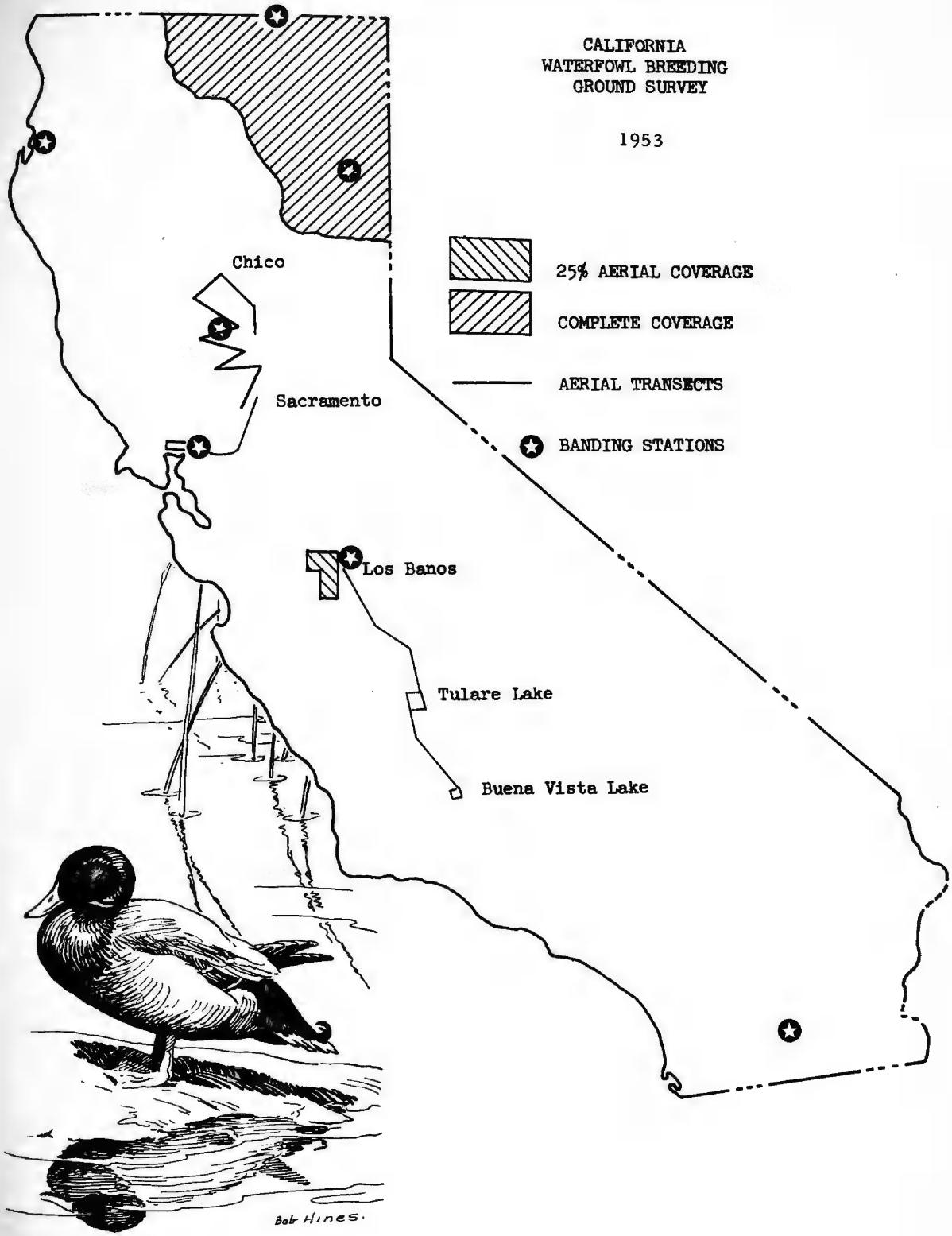
Goose production in California is confined to the northeastern section and involves only Canada geese. By June 1 when the survey is made in this region, the nesting season is over for this species and most of the birds are more than half grown. The total number of old and young is counted and this figure is used for the total fall population.

Insofar as possible the areas covered, census routes travelled, and methods employed have been duplicated from the pattern established in previous years. Census flights were made with a pilot and two observers. On some flights a different observer was used than in previous years, but in all cases at least one of the observers had flown the census route before.

All of the aerial transects were flown at elevations of 150 feet at speeds of 85 to 90 miles per hour with the two observers covering a ground strip 1/8-mile wide on either side of the airplane. Under these conditions experienced observers can accurately record species and sex of those ducks exhibiting divergent sex characteristics as well as note whether the birds occurred as pairs, singles, or groups of males.

Results

For the following areas comparable data have been gathered in all four years. A standard pattern of reporting has been used to include pertinent facts with reference to individual areas. On a sampling basis, coverage of the entire State production can be considered as essentially complete; thus figures are shown as actual numerical estimates of the total number, rather than as ducks per square mile. Data on individual areas studied are summarized with such remarks as are pertinent. "Total fall population" includes resident adults plus locally reared young.


CALIFORNIA
WATERFOWL BREEDING
GROUND SURVEY
1953
25% AERIAL COVERAGE
COMPLETE COVERAGE
AERIAL TRANSECTS
BANDING STATIONS
Chico
Sacramento
Los Banos
Tulare Lake
Buena Vista Lake
Bob Hines.

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1. Sacramento Valley
   a. Area - 2,400 Square Miles.
   b. Type - Agricultural land including 290,000 acres of rice, plus managed refuges and private gun clubs.
   c. Coverage - 2 & 1/2 percent aerial 1950 and 1951, 4 & 1/2 percent aerial in 1952, 2 & 1/2 percent aerial in 1953.
   d. Production summary:

	Estimated Total Nesting Pairs				Total Fall Population			
Species	1950	1951	1952	1953	1950	1951	1952	1953
Mallard	28,920	29,240	34,300	25,930	145,000	150,000	171,500	90,750
Gadwall	120	200	600	600	750	1,000	3,000	2,100
Pintail	40	0	300	200	250	0	1,500	700
Cinn. Teal	440	400	1,700	1,160	2,500	2,400	8,500	4,060
Redhead	0	0	60	70	0	0	300	240
Shoveler	0	80	40	240	0	400	200	840
Total	29,480	29,920	37,000	28,200	148,500	153,800	185,000	98,690
Coot	1,140	1,720	4,500	8,080	5,000	8,000	22,500	28,280

   e. Remarks: There was an indicated decrease of 24 percent in nesting pairs of ducks, and a 47 percent decrease in the total fall population. This decrease is thought to be due to the wide spread spraying of the rice crop with dieldrin during May and June. This spray seemed to be lethal to many birds - especially egrets. An aerial reconnaissance the first of July revealed only a few broods. Pairs of coots increased 80 percent but the total fall population increased only 25 percent, probably due to the dieldrin spraying.

2. Suisun Marsh
   a. Area - 140 Square Miles.
   b. Type - Natural tidal marsh, private gun clubs and agricultural land.
   c. Coverage - Aerial: 5 & 1/2 percent 1950, 5 percent 1951, 5 percent 1952, 5 percent 1953.
   d. Production summary:

	Estimated Total Nesting Pairs				Total Fall Population			
Species	1950	1951	1952	1953	1950	1951	1952	1953
Mallard	1,913	980	3,640	1,400	10,000	5,000	18,100	7,000
Gadwall	180	340	480	200	900	2,000	2,500	1,000
Cinn. Teal	54	100	580	100	350	550	2,900	460
Others	180	20	180	140	1,000	100	900	700
Total	2,327	1,440	4,880	1,840	12,250	7,650	24,400	9,160
Coot	-	-	180	120	-	-	900	600

   e. Remarks: Figures indicate a 62 percent decrease in both nesting ducks and in the fall population.

3. North San Francisco Bay
   a. Area - 30 Square miles.
   b. Type - Tidal salt marsh, gun clubs, river delta pasture land.
   c. Coverage - Aerial 10 percent 1950, 15 percent 1951, 15 percent 1952, 15 percent 1953.
   d. Production summary:

Species	Estimated Total Nesting Pairs				Total Fall Population			
	1950	1951	1952	1953	1950	1951	1952	1953
Mallard	806	560	480	440	4,000	2,700	2,400	2,200
Gadwall	56	73	130	90	300	350	650	470
Pintail	9	7	30	140	50	35	150	700
Shoveler	9	7	10	30	50	40	50	150
Ruddy duck	74	0	60	90	350	0	300	270
Others	-	-	140	90	-	-	700	270
Total	954	647	850	880	4,750	3,125	4,250	4,060
Coot	-	-	-	250	-	-	-	1,250

   e. Remarks: Essentially the same as previous years.

4. North San Joaquin Valley (Grasslands).
   a. Area - 150 Square Miles.
   b. Type - Gun clubs and intermittently flooded pasture lands.
   c. Coverage - Aerial 25 percent 1950, 1951, 1952, 1953.
   d. Production summary:

Species	Estimated Total Nesting Pairs				Total Fall Population			
	1950	1951	1952	1953	1950	1951	1952	1953
Mallard	1,304	1,703	2,070	1,420	6,600	8,500	10,350	4,420
Gadwall	56	192	280	180	300	1,000	1,400	570
Pintail	24	100	30	80	150	500	150	330
Shoveler	8	12	50	200	60	70	250	640
Redhead	20	88	20	60	100	450	100	190
Tree Duck	6	0	0	0	40	0	-	-
Ruddy Duck	32	28	0	30	180	160	-	100
Cinn. Teal	76	173	340	180	500	900	1,700	620
Total	1,526	2,295	2,790	2,150	7,930	11,580	13,950	6,870
Coot	446	724	960	3,900	2,000	3,500	4,800	10,770

   e. Remarks: There was a 23 percent decrease in breeding pairs of ducks, and a 50 percent decrease in the fall population. Current nesting studies (See section on Nesting Studies) indicated a heavy nest mortality in the Grasslands area. Coots showed a 300 percent increase in nesting pairs and a 125 percent increase in the fall population.

5. San Joaquin Valley
   a. Area - not determined.
   b. Type - Flooded lake bottoms, river channels and agricultural land.
   c. Coverage - Aerial. Variable (10 percent to complete coverage).
   d. Estimated Total Nesting Pairs:

Species	Spring 1952	Spring 1953
Mallard	1,700	2,570
Gadwall	290	50
Cinn. Teal	190	200
Redhead	70	30
Pintail	40	190
Shoveler	10	30
Ruddy duck	0	140
Tree duck	20	10
Total	2,320	3,220
Coot	2,600	4,700

   e. Remarks: An increase of 39 percent for ducks and 80 percent in coots is indicated. Buena Vista, Hacienda, and Tulare Lakes furnish nesting habitat only during wet cycles and cannot be relied upon for continued production. We have no data on the average nesting success or brood size on which to base production. The above figures are not included in the State-wide totals.

6. Northeastern California
   a. Area - not determined.
   b. Type- Natural marshes, lakes and artificial impoundments.
   c. Coverage - Aerial, complete 1949, 1950, 1951, 1952 and 1953 supplemented by ground checks.
   d. Production summary:

	Estimated Total Nesting Pairs				Total Fall Population			
Species	1950	1951	1952	1953	1950	1951	1952	1953
Canada geese	1,950	2,000	2,560	2,310	12,000	13,350	14,200*	12,830*
Mallard	2,650	4,460	7,120	5,430	10,500	23,540	50,980	32,620
Gadwall	1,660	1,470	820	710	9,000	9,250	6,810	4,710
Pintail	1,750	1,970	2,440	1,130	6,800	7,190	16,230	6,380
G-w. Teal	10	30	40	10	60	140	200	50
B-w. Teal	15	20	20	20	680	110	120	100
Cinn. Teal	2,360	1,150	770	630	14,000	5,400	4,840	4,130
Shoveler	670	235	250	140	2,900	1,500	1,880	630
Redhead	520	875	430	700	3,000	4,770	2,410	5,200
Scaup	60	150	140	130	400	880	1,010	1,040
Ruddy duck	275	290	100	190	1,800	1,500	440	1,260
Others	250	320	90	200	1,200	1,740	480	1,080
Total (duck)	10,220	10,970	12,220	9,290	50,340	56,020	85,400	57,200
Coot	1,450	1,710	1,650	3,620	7,400	12,800	9,770	21,050

* Includes 3,260 non-breeding birds in 1952, and 2,950 non-breeders in 1953.

e. Remarks: This area shows a decrease of about 24 percent in the duck nesting population over last year. Brood production was also down, so that the total fall population was down about 33 percent over 1952. Both the breeding and fall populations of the Canada Geese were down 10 percent. Some flooding of goose nests occurred in the Goose Lake Area, which resulted in a lower production. The breeding population of Coots was up 125 percent and the fall population showed an increase of 115 percent over 1952.

7. Tule Lake, Lower Klamath Refuges (Klamath Basin).
   a. Area - 35,000 acres of water and marsh with surrounding cultivated grain lands.
   b. Type - Great Basin. Natural and managed marsh areas.
   c. Coverage - Ground observation 1950, 1951, 1952, 1953, supplemented with aerial counts in 1952 and 1953.
   d. Production summary:

Species	Estimated Total Nesting Pairs				Total Fall Population			
	1950	1951	1952	1953	1950	1951	1952	1953
Canada Geese	1,300	1,500	640	430	10,300	11,500	5,040*	4,730*
Mallard	3,250	3,600	2,270	2,630	26,300	27,500	18,600	20,000
Gadwall	5,500	6,000	3,200	4,800	48,100	50,000	27,200	45,800
Pintail	505	400	440	280	6,510	3,400	3,230	2,000
G-w. Teal	80	100	0	0	1,100	1,000	0	0
B-w. Teal	295	150	100	60	2,560	1,250	710	460
Cinn. Teal	2,300	2,000	1,210	1,130	23,000	18,000	9,100	8,640
Shoveler	510	600	760	200	5,900	6,000	6,080	1,370
Redhead	5,000	4,800	2,800	3,270	49,400	45,000	22,100	28,930
Scaup	850	1,000	150	70	8,400	9,000	1,230	620
Ruddy duck	3,200	5,000	1,350	1,110	29,900	38,000	8,600	8,100
Others	260	300	20	10	2,400	3,000	140	80
Total (duck)	21,750	23,950	12,300	13,520	203,570	202,150	96,990	116,000
Coot	5,000	6,000	3,900	4,500	36,000	40,000	24,000	27,300

*Includes 1,600 non-breeding birds in 1952 and 2,290 non-breeders in 1953.

e. This important area showed a 33 percent decrease in breeding pairs of Canada geese and a 6 percent decrease in the total fall population. Nesting ducks showed an increase of 10 percent and a 20 percent increase in the total fall population. Coots showed a 15 percent increase in breeding pairs and in the total fall population.

8. State-wide Trend.

A comparative summary of nesting pairs of waterfowl for the past four seasons together with final fall population including young plus resident adults is shown in the following table. These figures for each year have been derived from the preceding tables. In almost

all cases the figures shown previously for "nesting pairs" are more accurate than those indicating "total fall population." The 1952 and 1953 figures are not directly comparable with the 1950 and 1951 figures since basic changes were made in the methods of obtaining data from the Tule Lake and Lower Klamath refuges in 1952.

Species	Estimated Total Nesting Pairs				Total Fall Population			
	1950	1951	1952	1953	1950	1951	1952	1953
Canada Geese	3,250	3,500	3,200	2,740	22,300	24,850	19,240	17,562
Mallard	38,843	40,543	49,880	37,250	202,400	217,240	271,930	156,990
Gadwall	7,572	8,275	5,510	6,580	59,350	63,600	41,560	54,650
Pintail	2,328	2,477	3,240	1,830	13,760	11,125	21,260	10,110
Cinn. Teal	5,230	3,823	4,600	3,200	40,350	27,250	27,040	17,910
G-w. Teal	90	130	40	10	1,160	1,140	200	50
B-w. Teal	395	170	120	80	3,240	1,360	830	560
Redhead	5,540	5,763	3,310	4,100	52,500	50,220	24,810	34,560
Shoveler	1,197	934	1,110	810	8,910	8,010	8,460	3,630
Scaup	910	1,150	290	200	8,800	9,880	2,240	1,680
Ruddy duck	3,581	5,318	1,510	1,420	32,230	39,660	9,340	9,730
Others	696	640	430	440	4,640	4,840	2,220	2,130
Total (ducks)	66,342	69,222	70,040	55,920	427,340	434,325	409,890	292,000
Coot	8,036	10,154	11,190	20,470	50,400	64,300	61,970	89,250

e. Remarks: The accumulated data indicates:

(1) A 14 percent decrease in nesting pairs of the Canada geese and a 9 percent decrease in the total fall population, which continues the gradual decline recorded for this species. Prior to this year the goose population had been characterized by a decrease in the Klamath Basin, and an increase in the rest of Northeastern California. It was presumed that this condition was brought on mainly by agricultural development in the Klamath Basin and a wet cycle which furnished more and better habitat in the remainder of Northeastern California. If the decline continues on both areas, it would seem that over-shooting might be taking place since special studies indicate that nesting is fairly successful.

(2) The number of breeding pairs of ducks decreased 20 percent and the total fall population was down 29 percent. There was an indicated decrease in all species except gadwall, redhead, and ruddy duck. Mallards dropped 42 percent and accounted for most of the over-all decrease since it is major species nesting in the State. Botulism in the Central Valley last fall and the early spring migration might have accounted for the decrease.

(3) The nesting coot population increased 83 percent and the total fall population showed an increase of 44 percent. Some of this increase may be due to an increased awareness of the presence of

this bird. Five years ago not too much attention was paid to this species, but each year since then its increasing numbers, and aggravating depredation problems have brought it into the limelight. That it has increased cannot be denied. It is felt that future surveys will indicate more accurately the trend, since an attempt was made this year to get an accurate count of coot on all areas.

Nesting Studies

Duck nesting studies were carried on at Honey Lake, Suisun Marsh and in the Grasslands of the north San Joaquin Valley. They are briefly summarized below:

Fate	Honey Lake	Suisun Marsh	Grasslands
Hatching success	50 percent	48 percent	16 percent
Destroyed by predator	35 "	48 "	61 "
Destroyed by cattle	0 "	0 "	6 "
Flooded	1 "	0 "	7 "
Deserted	14 "	4 "	10 "
	100 percent	100 percent	100 percent
Total Number of Nests Found:	358	29	319

Coot Nesting

Fate	Honey Lake	Grasslands
Hatching success	98 percent	10 percent
Destroyed	2 "	85 "
Flooded	0 "	0 "
Deserted	0 "	5 "
	100 percent	100 percent
Total Number of Nests Found	143	20

Banding

During the summer and fall 16,206 ducks, 1,503 Canada geese and 183 coots were banded on six major waterfowl areas prior to September 15. Species, sex and age data are presented in the following table:

California Waterfowl Banding Summary

June 15 to September 15, 1953

Species	Adult Male	Immature Male	Adult Female	Immature Female	Immature	Uncl.	Total
Mallard	1,953	1,334	638	751	-	-	4,676
Pintail	5,929	2,181	1,293	1,089	-	-	10,492
Gadwall	-	259	1	224	-	-	484
Baldpate	1	-	-	1	-	-	2
G-w. Teal	10	10	1	4	-	-	25
Cinn. Teal	2	29	11	39	-	-	81
Shoveler	-	6	-	4	-	-	10
F. Tree Duck	-	5	-	4	-	-	9
Redhead	5	175	61	131	-	-	372
Lesser scaup	2	13	-	13	-	-	28
Canvasback	5	1	2	1	-	1	10
Ruddy duck	-	3	4	9	-	-	16
Bufflehead	-	-	-	1	-	-	1
Canada goose	509	-	304	-	690	-	1,503
Coot	-	-		-	59	124	183
Florida Gallinule		-		-	-	1	1

WATERFOWL BREEDING GROUND SURVEY IN NEVADA - 1953

Fred E. Wright

Introduction

It has not been possible to cover the most of the trend areas more than once during the breeding season, and in some instances the period of observations are not close enough from one year to the next to be comparable. Several new areas were checked to determine whether they should be considered as key areas, which have become accessible through the use of the airboat. The Humboldt Sink area will be added next year.

Methods

The reservoirs in northeastern Nevada were checked once this year by boat and the Humboldt River aerial transects were not covered for the second year. The several trend areas in west-central Nevada were checked twice by car, but it was not possible to expand the number of areas in this region to obtain a better sample.

Weather and Water Conditions

The weather through May and June was cold and stormy in the west and across the northern part of the State. The forecast for snow water run-off was from about normal in the north and west to below normal in the central and southern part of the State. Stored water was near capacity for most of the State. The late storms in May and June resulted in a one month delay in the growing season. Water on two trend areas was low with one of these being about two-thirds dry..

Duck Production

The number of nesting pairs was about the same to greater this year on the trend areas and pointed to a fair increase in production. The final production figure, however, indicates an average decrease of 30 percent.

Table I. - Total of all Brood Classes by Species for 1952 and 1953 on Reservoir Trend Areas for a Comparative Period.

Species	Broods		Young		Average	
	1952	1953	1952	1953	1952	1953
Mallard	16	14	96	82	6.0	5.85
Pintail	16	11	97	63	6.06	5.72
Gadwall	35	14	260	122	7.44	8.74
Cinnamon teal	10	12	52	82	5.20	6.82
Green-winged teal	5	5	30	42	6.0	8.4
Redhead	1	-	1	-	1.0	-
Lesser Scaup	11	9	70	72	6.35	8.0
Baldpate	-	1	-	5	-	5.0
Total	94	66	606	468	6.45	7.09

22.8 percent decrease in number of young
29.8 percent decrease in number of broods

Table II. - Total of all Brood Classes by Species for 1952 and 1953 on Small Pond Trend Areas in West-Central Nevada for a Comparative Period

Species	1952 Broods	1953 Broods	1952 Young	1953 Young	1952 Average	1953 Average
Mallard	10	8	76	45	7.6	5.64
Pintail	4	5	16	24	4.0	4.8
Gadwall	27	7	213	44	7.88	6.3
Cinnamon teal	9	4	64	24	7.1	6.0
Redhead	25	12	157	58	6.4	4.84
Ruddy	10	7	60	40	6.0	5.72
Baldpate	3	-	24	-	8.0	-
Total	88	43	610	235	6.95	5.48

51.2 percent decrease in number of broods.
61.5 percent decrease in number of young.

Table III. - Waterfowl Production on the Stillwater Wildlife Management Area for 1952 and 1953

Species	1952	1953
Canada Geese	75	25
Mallard	2,454	951
Gadwall	2,608	1,224
Baldpate	108	180
Pintail	220	81
Green-winged teal	18	-
Blue-winged teal	-	18
Cinnamon teal	4,113	2,451
Shoveler	45	-
Redhead	3,388	2,621
Ruddy	171	118
Total	13,214	7,644

Production on the Stillwater Wildlife Management Area shows a 42 percent decrease in the number of young although there was a 32 percent increase in nesting pairs.

The average brood size of 6.3 for all areas is comparable to the average for last year of 6.2.

The Humboldt-Toulon area was covered for the first time by using an airboat. The trip was made during the first part of August. A total of 24 redhead broods with 176 young was observed, two mallard broods with 12 young, one gadwall brood of 9, one ruddy brood of 5 and one cinnamon teal brood of 18 were also seen.

Franklin Lake north of Ruby Lake National Wildlife Refuge was covered by airboat. This is an extensive area which is in part intermittent, but for the past several years had held more water than normal. It is estimated that approximately 10 percent of the area was covered this year.

Table IV. - Total of all Brood Classes by Species for Franklin Lake Area

Species	Broods	Young	Average
Mallard	2	14	7.0
Gadwall	18	136	7.55
Cinnamon teal	14	85	6.1
Redhead	13	78	6.0
Canvasback	1	5	5.0
Total	48	318	6.64

The Sheldon National Antelope Refuge and Ruby Lakes National Wildlife Refuge both report an increase in production of approximately 10 percent.

Goose Production

Pyramid Lake - On June 19, 2,627 geese were observed on an aerial count. They were in groups of from 4 to 400 within separate areas around the lake except for the south half of the west side. The congregation of groups ranged from 100 birds to 1,155 birds. No young were observed, all birds being fully feathered. They were not pressed to determine what percent was molting and flightless.

Washoe Lake - Washoe Lake was covered on June 18, but high winds prevented covering anything but some of the nesting islands. A check of 54 nests revealed that 22 contained no unbroken eggs; 10 contained 2 unbroken eggs with 13 and 14 eggs being found at 2 nest sites. The 54 nests contained a total of 118 eggs for an average of 2.18 unbroken eggs per nest. Again wave action and high water are believed to be the main cause of unsuccessful nests or incomplete hatching of clutch.

On July 10 a check of the Lake was made and 363 young were seen accompanied by 94 adults for an average of 3.86 young per adult.

Summary

The breeding population this season was higher than that of the previous season.

Water conditions were not as good as last year, but were in general better than for the 1949 through 1951 period.

Gadwall production was lower on all areas checked with an average decrease of 66 percent in numbers of broods seen and 55 percent decrease in numbers of young seen.

Based on the brood data gathered this season the species in order by number of young seen was redhead, cinnamon teal, gadwall, mallard, ruddy duck, baldpate, pintail, scaup and green-winged teal.

Banding was carried on for a 2 week period during September with a total of 316 ducks being banded.

Banding Summary

Species	Adult Male	Immature Male		Adult Female	Immature Female		Total
Mallard	6	4	-	1	-	-	11
Pintail	142	31	17	34	22	28	274
Redhead	-	8	3	-	6	5	22
Green-winged teal	4	1	2	-	2	--	9
Total	152	44	22	35	30	33	316

WATERFOWL BREEDING GROUND SURVEY IN IDAHO

Robert L. Salter

Waterfowl work in Idaho during 1953 was done under Federal Aid Project 96-R-4. District biologists Elwood Bizeau, Charles Blake, Hugh Harper and Charles Haynes were responsible for activities in their districts. Mr. F. Sheldon Dart, Refuge Manager, Deer Flat National Wildlife Refuge cooperated as in the past on the goose nesting work on the Lower Snake River. Conservation officers contributed to the waterfowl brood counts taken during regular patrol duties.

This year several breeding pair transects and brood routes were established for ducks. Since this is the first year for such work and no trend information is available, it will not be presented here.

Weather and Water

The mild winter experienced during 1952-53 blended into spring with every impression that Idaho would experience a very early spring. This trend continued during March and the forepart of April. The latter part of April, all of May and early June were characterized by unseasonably cold weather and recurring rain storms. About the middle of June the earlier pattern set in and the weather for the rest of the summer was hot and dry.

The snow pack was ample to insure adequate water for all irrigation projects. The run-off progressed satisfactorily and no serious flooding was reported in the State.

Goose Nesting Study

A Canada goose nesting study on four areas on which direct comparisons with the 1952 season can be drawn was continued this year. The same areas were covered in the same manner.

The results of the 1953 work are shown in Table I. A comparison of this year's results and those of 1952 is shown in Table II. The goose nesting on these four areas, which represent a good sample of the major goose breeding areas of the State, was definitely up (25 percent) over last year. Due to increased nesting success, primarily on the Homedale Unit, the production was also higher (53 percent) than during 1952.

Brood Counts

Waterfowl brood counts were taken by Biologists, Fish and Wildlife Service personnel and Conservation Officers with primary emphasis being placed on determination of brood survival. The bulk (506 out of 641) of the brood counts came from southeastern Idaho. The State-wide totals are given in Table III.

Banding

Banding efforts during the summer were concentrated on Canada geese. In cooperation with G. Hortin Jensen, Flyway Biologist, U. S. Fish and Wildlife Service, Canada goose banding work was continued on Blackfoot and Island Park Reservoirs and initiated on North Lake Refuge in Jefferson County. With the assistance of F. Sheldon Dart and James S. Cromwell, U. S. Game Management Agent, goose banding on the Lower Snake River was begun this year. The banding on Dingle Swamp was done by Henry M. Reeves, Conservation Officer, and that on Gray's Lake by Elwood G. Bizeau, Biologist.

The results of the summer banding are shown in Table IV.

Table I. - Results of Canada Goose Nesting Survey in Idaho, 1953

	Glenns Ferry	Homedale	Blackfoot Reservoir	Island Park Reservoir
No. of nests found	24	250	121	44
No. of nests terminated	24	250	119	43
No. of successful nests	11 (46 %)	180(72%)	74 (62%)	36 (84 %)
No. of unsuccessful nests	13 (54 %)	70(28%)	45 (38%)	7 (16 %)
Av. clutch - successful nests	5.9	5.5	5.6	5.2
Av. hatch, - successful nests	5.4	5.0	4.8	4.6

Table II. - Comparison of Goose Production on Four Areas, 1952-1953

	Glenns Ferry	Homedale	Blackfoot Reservoir	Island Park Reservoir	Total
No. nests found					
1952	24	208	103	16	351
1953	24	250	119	44	437
No. nests hatched					
1952	16	103	75	12	206
1953	11	180	74	36	301
Average Hatch					
1952	5.1	4.7	4.7	4.0	4.7
1953	5.4	5.0	4.8	4.6	4.9
Estimated Production					
1952	82	484	352	48	966
1953	60	900	355	166	1,481

Table III. - Idaho Brood Counts - Summer 1953

Species	Class I			Class II			Class III		
	No. Broods	No. Birds	Av.	No. Broods	No. Birds	Av.	No. Broods	No. Birds	Av.
Mallard	140	864	6.2	58	360	6.2	72	411	5.7
Redhead	69	437	6.3	35	194	5.5	17	112	6.6
Gadwall	45	328	7.3	8	51	6.4	-	-	-
Pintail	24	165	6.9	12	71	5.9	12	63	5.2
Ruddy	13	68	5.2	5	18	3.6	1	5	5.0
Scaup	24	201	8.4	3	17	5.7	2	10	5.0
Canvasback	7	31	4.4	10	53	5.3	6	18	3.0
Baldpate	15	103	6.9	5	32	6.4	2	12	6.0
Shoveler	5	24	4.8	4	28	7.0	5	26	5.2
Teal, Cinn. & B-w.	7	44	6.3	4	30	7.2	3	12	4.0
Teal, G-w.	7	46	6.7	2	9	4.5	3	21	7.0
Bufflehead	-	-	-	1	7	7.0	3	19	6.3
Am. goldeneye	2	7	3.5	-	-	-	-	-	-
Wood duck	1	3	3.0	-	-	-	-	-	-
Total	359	2,321		147	870		126	709	
Averages			6.5			5.9			5.6

Table IV. - Idaho Banding Data - Summer 1953

Species & Area	MALE			FEMALE			Total
	Adult	Immature	Local	Adult	Immature	Local	
Canada Geese							
Blackfoot Reservoir	76	-	16	89	-	11	192
North Lake Refuge	91	-	1	91	-	5	188
Homedale	5	-	50	5	-	64	124
Island Park Reservoir	2	-	42	4	-	35	83
Crane Creek Reservoir	3	-	2	2	-	3	10
Hammett	-	-	1	1	-	6	7
Cascade Reservoir	2	-	1	-	-	-	3
Dingle Swamp	1	1	3	2	-	3	10
Gray's Lake	-	-	2	-	-	3	5
Total	180	1	118	193	-	130	622

WATERFOWL BREEDING GROUND SURVEY IN UTAH - 1953

Noland F. Nelson and Clark Johnson

Introduction

This survey represents the fifth year that the Fish and Game Department has made a breeding ground survey in Utah. No effort has been made to get complete coverage of the State. Instead, surveys have been concentrated on those areas which are known to contain the bulk of waterfowl breeding population in the State. Each year the survey has been expanded to cover a larger portion of the State, and this year additional transects were established on each section surveyed in order to get more intensive coverage.

Waterfowl populations and the production of birds are closely associated with the major rivers and irrigated lands within the State. Most of the State is arid and these irrigated areas are limited. The main waterfowl areas are in the Salt Lake Valley, Cache Valley, Utah Valley, and the Sevier River section. There are vast sections of excellent marshland on the river deltas and in the lowlands flooded by irrigation drainage in this section. It is difficult to establish an accurate census method for this type of habitat. Nesting waterfowl are scattered throughout the farms, canals, and drains associated with irrigated farming and are seldom seen in ground or aerial transects. Extremely heavy concentrations of waterfowl are found in the dense marshes which makes accuracy in counting difficult. While it is known that many waterfowl are not counted, aerial and ground transects have been established and counted on the same route each year to determine general trends in breeding population.

Survey Methods

Aerial transects flown in 1952 were again flown this year. Additional coverage was established in Box Elder, Weber and Salt Lake Counties. New routes were flown in Cache County and the Sevier River drainage. All the aerial transects were flown at elevations of 200 feet at speeds of 75 to 80 miles per hour, with 2 observers covering a ground strip 1/8-mile wide on either side of the airplane. Observers in most areas were able to record the species and sex of those ducks exhibiting divergent sex characteristics, as well as to note whether birds occurred as pairs, singles or groups.

Intensive ground counts were made on key State waterfowl areas to supplement the aerial counts. Ground counts were also made along aerial transect routes to determine the accuracy of the counts and to establish the composition of birds along the transect routes. Brood counts were conducted on key State waterfowl areas.

Weather and Water Conditions

Stream run-off was normal so that little marsh area was subject to nest flooding. The winter was mild so many migrants arrived to the Utah breeding grounds somewhat earlier than normal. The spring weather was cold and subject to several unseasonable snow storms. Canada goose nesting was subject to this extreme weather. However, duck nesting weather was good.

Aerial Census

The number of square miles sampled was over double the coverage of 1952. This increase was brought about by more intensive coverage of some areas and new census routes. There was a general increase in the ducks per square mile from 53.6 in 1952 to 59.2 in 1953 when the same census areas were compared. The following table gives a summary of counts on all transects.

Table I. - Total Ducks Counted by Area and Square Miles as Determined from Aerial Surveys - 1952 and 1953

Route	Sq. Mi. Sampled		Total Ducks		Ducks per Sq. Mi.	
	1952	1953	1952	1953	1952	1953
Cache	0.0	14.5	-	129	-	8.5
Box Elder	20.0	48.0	1,160	2,946	57.9	64.5
Weber	6.5	14.4	401	2,068	61.7	143.6
Davis	14.2	14.2	718	386	50.1	27.2
Jordan River Clubs	6.7	6.2	663	670	99.0	108.0
Salt Lake County	6.7	6.7	277	101	41.3	15.0
Utah County	18.0	18.0	646	199	35.9	11.0
Sevier River	0.0	45.0	-	1,362	-	30.3
Total	72.1	167.0	3,865	7,861	53.6	47.0

Table II. - Composition of Ducks Observed in Ground Counts on Aerial Transect Routes -- 1953

Species	Pairs	Lone Males	Lone Females	Unclassified	Total	Percent
Redhead	353	31	11	455	850	28.4
Cinnamon teal	478	98	15	72	663	22.2
Mallard	188	211	45	235	679	22.7
Gadwall	150	28	5	31	204	6.8
Ruddy	22	15	3	285	325	10.8
Shoveler	50	56	0	12	118	3.8
Pintail	68	45	6	15	134	4.6
Green-winged teal	2	0	0	15	17	0.6
Blue-winged teal	2	0	0	0	2	0.1
Lesser scaup	-	-	-	-	-	-
Baldpate	-	-	-	-	-	-
Total	1,313	484	85	1,120	2,992	100.0

The decline in the number of ducks counted in Davis County could be attributed to the rise in Great Salt Lake which destroyed many of the marshes along the lake shore. However, there is no satisfactory explanation for the decline in Utah and Salt Lake Counties. The bulk of the better waterfowl habitat is in those counties which had an increase in population so the over-all State picture would be a slight increase in the breeding population.

Redhead, mallard, then cinnamon teal were the most abundant species of ducks counted on the survey. There was a large increase in the number of mallards as compared to previous years. Other species remained nearly the same as in previous years.

Ground Counts

Counts of lone males, pairs, and lone females on State key census areas indicated that the potential breeding population had decreased on these areas. Cinnamon teal showed a marked increase but other species such as Canada geese continued to decline.

Table III. - Estimate of Total Breeding Pairs on State Refuges from Dike Line Census -- 1953

Species	Ogden Bay		Farmington Bay		Public Shooting Grounds	
	1952	1953	1952	1953	1952	1953
Canada geese	118	114	25	62	32	21
Mallard	325	267	125	84	200	99
Gadwall	317	257	150	57	35	40
Pintail	225	215	55	63	55	31
Cinnamon teal	625	712	225	303	175	121
Redhead	510	296	220	120	230	288
Shoveler	63	121	63	69	25	33
G-w. teal	2	2	-	-	-	-
B-w. teal	22	6	4	5	3	2
Ruddy	18	30	16	20	3	2
Baldpate	2	1	-	-	-	-
Total	2,227	2,021	883	783	758	637

Brood Counts

General observations indicate a good survival on broods except for some of the earlier mallard broods. Canada geese brood survival was good on refuge areas counted.

Summary

1. The Utah Fish and Game Department continued and expanded the aerial breeding ground survey in Utah. This survey was supplemented by ground counts on State refuge and ground counts along aerial transect routes.

2. Unseasonable cold weather and snow storms in the early spring were adverse to early nesting geese and ducks. The late nesting season was good with little high run-off water to flood nesting areas.

3. The aerial census of 1953 covered 668 linear miles or 167 square miles. A total of 7,861 ducks were counted on these flights, or an average of 47.0 ducks per square mile. When the same sample areas were compared, there was an increase from 53.6 ducks per square mile to 59.2 ducks per square mile.

Counts on key State refuges showed a general decrease in duck and goose population. Cinnamon teal showed a large increase.

4. Redheads, mallard, and cinnamon teal were the most prominent species noted on the aerial census routes. There was a large increase in the number of mallard counted.

5. There was a good survival of broods on key areas counted.

WATERFOWL BREEDING GROUND SURVEY IN WYOMING, 1953

Robert M. Ballou and George Wrakestraw *

Introduction

In May and July, 1953, breeding ground surveys were conducted for the first time on all of the major breeding areas in Wyoming. In 1952 only the western slope drainages and a portion of the North Platte River drainage were censused. Comparative data on the success of the breeding seasons in 1952 and 1953 are available in some areas. Results obtained, particularly from the July brood counts, indicate that sampling methods will have to be revised to secure reasonably accurate total waterfowl production figures for the State.

Methods

For the second year aerial coverage by streams was the principal technique employed for the survey. Due to the much larger coverage this year, ground surveys were used to a much lesser extent. Data were classified by drainages. In as much as possible, the same planes, pilots and survey personnel were used as in 1952.

In accordance with recommendations made by the Technical Committee of the Central Flyway Council, an attempt has been made this year to arrive at a tentative figure for total waterfowl breeding pair populations for Wyoming. It is believed that virtually all of the goose nesting habitat in the State was surveyed, and the goose breeding population total was taken directly from the census sheets.

To obtain the total State-wide duck breeding population the breeding ducks per mile for the streams flown in each drainage was computed. The resultant figure for each drainage was then multiplied by the total miles of stream within each drainage. Adjustments were made where necessary to conform with known variables. It is recognized that this technique is subject to a number of serious errors, but greater familiarity with the waterfowl habitat within the State and more representative sampling in future years should eventually bring the estimated total duck breeding population figure close to reality.

Drainage Characteristics, Weather, and Water Conditions

Western Slope Drainages

Water conditions for the Snake, Salt, Bear and Green River drainages were little below average this year. An early, dry, warm spell followed by a period of low temperatures and unsettled weather, made for a late, relatively even spring run-off.

Central and Eastern Wyoming

The central and eastern sections of Wyoming, surveyed for the first time this year, fall into three large drainage regions. The North Platte River drainage occupies the southeast quarter of the State. In its upper reaches, the Platte is a fast-flowing,

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foothill stream, moderately productive in waterfowl. The central and lower portions flow through semi-desert and shortgrass prairies. Its central section, downstream from its entry into Seminoe Reservoir, and its major tributaries---Sweetwater, Medicine Bow and Laramie Rivers---constitute its most productive waterfowl area. Except for upstream sections of a few tributaries the lower parts of the drainage have limited waterfowl production.

A generally dry spring and early summer in the Platte River drainage provided less waterfowl breeding habitat than was available in 1952, and continued dry weather into the summer caused a number of marginal nesting areas to dry up before the broods were on the wing. Spring run-off was late and flooding at a minimum.

The Wind and Big Horn Rivers are two sections of the same stream, separated by name at about the half way point where the river emerges from the Wind River Canyon. In as much as the physical characteristics and use by waterfowl of the two halves of the stream differ, the river has been considered as two drainages for the purposes of this project. An important feature of the Wind River drainage is the Riverton Irrigation Project, which has substantially increased the amount of available water and has provided quantities of grain foods for waterfowl. In addition, the upstream portions of the River, and its tributaries -- Little Wind and Popo Agie Rivers -- provide supplementary nesting habitat.

The Big Horn River drainage, largely as a result of the length of its tributaries and their productivity in the upper reaches, supports a moderate nesting population. The River offers limited breeding habitat, and can be closely compared to downstream portions of the Green River. Although the upper sections of the tributaries flow through mountainous and foothill country, the drainage is primarily a semi-desert region. Irrigation projects adjacent to the Shoshone and Greybull Rivers are of more importance to waterfowl in winter than during the breeding season.

Both the Wind and Big Horn drainages were characterized in early spring by much the same weather and water conditions as experienced west of the Continental Divide. Following a late spring period of low temperatures and stormy weather, however, this region had very little moisture.

The northeast quarter of Wyoming can be classified as a stockpond region. Four Rivers, the Tongue, Powder, Belle Fourche, and Cheyenne drain this area, but in themselves are of little importance to breeding waterfowl. It is reported that in wet years this stockpond country is an important duck producing region. In 1953 this area was of little value to waterfowl due to dry, spring weather. Rains in late June and July filled many of the reservoirs, but came too late to be of much benefit to the ducks.

Duck Breeding Pair Population and Production

Breeding Pair Population

Table I summarizes by drainages the total number of breeding ducks observed in the aerial census between May 1 and 14, 1953. Survey personnel were impressed this spring by the comparatively large number of ducks observed in groups on lakes and reservoirs as compared to 1952. Table IV indicates that over identical areas 573, or 73 percent more ducks were seen in groups in May of 1953 than in 1952. A cold spring and uncertain weather may well have been responsible for a late, slow migration, resulting in an apparent increase in the breeding population in May. In

computing the actual breeding population, only paired and single ducks were considered as the resident breeding population. Further examination of Table IV will be made in this connection below.

Table II presents the species composition of the duck breeding pair population in May 1953. Mallards composed 62 percent of the total, with gadwalls 10 percent, teal 8 percent, and American mergansers 8 percent, the only other important breeding species in the State.

An attempt has been made this year to obtain a tentative figure for the total duck breeding pair population for the State in May (Table III). The techniques used have been outlined under "Methods" above. Both mileage of streams flown and total miles of unsurveyed waterfowl habitat were taken off a 1" - 8 mile scale, base map of Wyoming with a map measurer. Perimeters were considered to represent the amount of duck habitat on lakes large enough to be shown on the map. It was assumed that the greater breeding density of large, downstream surveyed water areas would partially compensate for the myriad of marshes, ponds and small streams utilized by ducks in the mountains and foothills, but not shown on the base map and unknown to project personnel. In addition, mileage on a representative number of streams not surveyed were carried into the mountains farther than might ordinarily be warranted to include beaver ponds. In other cases mileage on unsurveyed streams was not measured for the entire portions on which ducks were known to nest. For instance, it would be unrealistic to credit the entire length of Smith's Fork (a tributary to the Bear River) with the same high nesting density as was found on the Bear River.

As has been mentioned above, it became apparent in the May inventory that ducks observed in large groups were migrating and could not be included as part of the resident breeding population of the areas flown. Also, large numbers of paired diving ducks, evident in May, but absent in July, were not considered as belonging to the resident breeding population. An adjustment was made, then, to correct Table I. The figures shown in column 3 of Table III represent only the total paired and single ducks believed to have nested on the portions of the drainages surveyed.

Species composition for the total State breeding pair population would not coincide (percentagewise) with Table II. The relative abundance of mallards, teal, mergansers and goldeneye would increase, whereas diving ducks, pintail, gadwall, baldpate and shovelers would register a significant drop.

Table I. - Total Number of Ducks Observed by Aerial Count on Major Drainages in Wyoming, May 1953

Drainage	Pairs	Singles *	Groups	Total Ducks
Green	797	387	596	2,964
Snake	473	360	471	2,137
Bear	605	332	528	2,402
Salt	369	366	270	1,740
Wind	536	348	5,147	6,915
Big Horn	422	332	586	2,094
Belle Fourche-Cheyenne	47	24	142	284
North Platte	5,493	85	1,617	12,773
Powder-Tongue	13	22	260	330
Total	8,755	2,256	9,617	31,639

* A single bird in May was considered as a mated pair.

Table II. - Species Composition of Identified Duck Breeding Populations In Wyoming - May 1953

Species	Green		Snake		Bear		Salt		Wind	
	No. Ducks	%	No. Ducks	%	No. Ducks	%	No. Ducks	%	No. Ducks	%
Mallard	1,160	63	858	57	886	62	1,056	78	788	86
Gadwall	46	2	20	1	78	5	30	2	-	-
Pintail	132	7	14	1	166	12	38	3	-	-
Baldpate	22	1	24	1	80	5	46	3	-	-
Teal	216	11	130	9	66	5	116	9	-	-
Shoveler	54	3	-	-	22	2	14	1	-	-
Redhead	40	2	-	-	60	4	-	-	-	-
Scaup	2	T*	-	-	-	-	-	-	-	-
Ruddy	18	1	-	-	-	-	-	-	-	-
Ringneck	-	-	-	-	-	-	-	-	-	-
Canvasback	-	-	-	-	16	1	-	-	4	1
Bufflehead	12	1	-	-	-	-	-	-	-	-
Amer. merganser	148	8	154	10	24	2	24	2	128	14
B. Goldeneye	2	T*	294	20	28	2	26	2	-	-
Harlequin	-	-	2	T*	-	-	-	-	-	-
Total	1,852		1,496		1,426		1,350	100	920	

Species	Big Horn		Belle-Fourche Cheyenne		North Platte		Powder-Tongue		Total	
	No. Ducks	%	No. Ducks	%	No. Ducks	%	No. Ducks	%	No. Ducks	%
Mallard	948	73	-	-	2,432	50	148	81	8,276	62
Gadwall	86	7	-	-	1,047	22	-	-	1,307	10
Pintail	24	2	-	-	202	4	-	-	576	4
Baldpate	2	T*	-	-	91	2	-	-	265	2
Teal	180	14	-	-	394	8	-	-	1,102	8
Shoveler	8	T*	-	-	166	3	-	-	264	2
Redhead	-	-	-	-	20	T*	-	-	120	1
Scaup	-	-	-	-	2	T*	-	-	4	T*
Ruddy	-	-	-	-	-	-	-	-	18	T*
Ringneck	-	-	-	-	-	-	-	-	-	-
Canvasback	-	-	-	-	-	-	-	-	20	T*
Bufflehead	-	-	-	-	-	-	-	-	12	T*
Amer. merganser	56	4	-	-	499	10	32	18	1,065	8
B. Goldeneye	-	-	-	-	-	-	-	-	350	3
Harlequin	-	-	-	-	-	-	-	-	2	T*
Total	1,304		-		4,853		180		13,381	

T = Less than 1 percent.

Duck Production

It is unfortunate that data this year on the number of broods in July per breeding pair in May, and on the average brood size were meager (Table V). Very poor success was encountered in the July aerial brood counts. Not enough information was secured to form a reliable index to State-wide duck production. In order to obtain usuable data on the success of the nesting season, the July inventory will have to be revised.

A comparison of the May and July aerial inventories in 1952 and 1953 over identical areas on Western Slope drainages (Table IV) indicates a 746 (10 percent) increase of total ducks in those areas in May of 1953, but a 1,109 (87 percent) decrease in numbers of young produced and a 882 (26 percent) reduction in total ducks observed in July. Furthermore, in May of 1952 there were nearly twice as many single males than paired birds, whereas pairs nearly doubled singles in May of 1953. Finally, the average duck brood size for the State dropped from 6.4 in 1952 to 5.7 in 1953.

Acutally duck production was undoubtedly considerably higher than the July inventory indicated. Observations of waterfowl habitat areas subsequent to the July inventory revealed a substantial number of young broods which were not seen during that inventory, indicating that spring weather conditions interferred with the normal egg-laying period, thus distributing the hatch more evenly throughout the summer. The greater number of paired ducks observed in the May inventory this year also suggests that the hens had not yet commenced incubation. In all probability, duck production in 1953, due to inclement spring weather, fell short of 1952.

Table III. - Breeding Duck Population for Wyoming in May, 1953*

Drainage	Miles of Stream Surveyed	No. of Breeding Ducks	Density / Mile of Stream Surveyed	Total Miles of unsurveyed Habitat	Total No. Breeding Ducks
Green River					
Upper Green (Above CCC Bridge)	168	1,482	8.9	352	4,615
Lower Green (Below CCC Bridge)	226	846	3.7	264	1,823
Green River Total	394	2,328		616	6,438
Snake River	192	1,666	8.7	184	3,267
Bear River	70	1,866	26.6	16	2,292
Salt River	74	1,470	19.9	6	1,590
Wind River	254	1,764	6.9	160	2,868
Big Horn River	294	1,508	5.1	240	2,732
Belle Fourche-Cheyenne River	188	142	.8	156	267
Upper North Platte River (Above Alcova Dam)	494	1,354	2.7	230	1,975
Lower North Platte River (Below Alcova Dam)	373	2,672	7.2	438	5,825
North Platte Total	867	4,026		668	7,800
Powder-Tongue River	290	70	.2	628	196
Total	2,623	14,840		2,674	27,450

*Exclusive of Yellowstone National Park.

Table IV. - Comparison of Ducks Observed by Aerial Count on Identical Areas

In May 1952 and 1953

	1952				1953			
Drainage	Pairs	Singles *	Groups	Total	Pairs	Singles *	Groups	Total
Green River	316	385	-	1,402	601	319	91	1,931
Bear River	413	694	111	2,325	605	332	528	2,402
Salt River	201	699	173	1,973	369	366	270	1,740
Snake River	236	384	503	1,743	473	360	471	2,137
Total	1,166	2,162	787	7,443	2,048	1,377	1,360	8,210

* A single was considered a mated pair in May.

In July 1952 and 1953

	1952					1953				
Drainage	Pairs	Singles*	Groups	Young	Total	Pairs	Singles*	Groups	Young	Total
Bear River	30	314	1,165	780	2,319	4	10	2,055	69	2,142
Salt River	15	73	71	220	394	1	25	90	31	148
Snake River	13	96	239	277	638	4	20	83	68	179
Total	58	483	1,475	1,277	3,351	9	55	2,228	168	2,469

* A parent with brood was counted as a single bird in July.

Canada Goose Breeding Pair Population and Production

Breeding Pair Population

The May aerial inventory covered virtually all of the goose nesting habitat within the State, exclusive of Yellowstone National Park. An intensive ground survey of the latter area in late May explored approximately 75 percent of the total goose habitat in Yellowstone. The results of both aerial and ground surveys are presented in Table VII. It is felt the total of 1,900 represents the number of geese in Wyoming in May, 1953. Of these 1,211 were found on Western Slope and Great Basin drainages, an increase of nearly 15 percent over 1952.

A thorough discussion of the hazards involved in considering a resident spring population of geese, particularly paired birds, as an actual breeding population has been given in the report on experimental studies designed to improve the status of the Canada goose populations throughout the State (Project W-50-R-2, Work Plan 1, Job No. 6). Briefly summarized, this discussion concludes that only the single geese observed in May represent the actual number of breeding pairs. On this hypothesis, breeding singles in Table VII have been adjusted upward from 251 to 335 on basis of a 25 percent nest mortality at the time of the May inventory.

Goose Production

Utilizing the number of breeding singles observed in May (251) multiplied by the average brood size obtained in July (4.2), a tentative production figure of 1,054 geese was derived. It was assumed that nest destruction, desertion, egg infertility and juvenile mortality following the time of the May inventory would compensate for undetected nesting geese.

Insufficient data were obtained from the July inventory to adjust or correct the goose production figure given above. Table VIII illustrates the invalidity of attempting to derive production figures from comparison of May and July aerial counts. The magnitude of goose movements within and across State boundaries for moulting purposes is so great that some drainages register a sharp decrease in numbers of geese observed between May and July, whereas other drainages show a definite increase. There is a large influx of geese, for instance, to Pathfinder, Seminoe, and Wheatland Reservoirs for moulting purposes which greatly exceeds the sum of the potential brood increment and the number of geese found on the North Platte drainage in May. In addition, comparisons of ground and aerial counts over the same areas in July of 1952 revealed that a large percentage of the broods were not detected from the air, and that many others cannot be distinguished from adults at that season.

Comparative data on trend areas for 1952 and 1953 (Table IX) points to a generally poorer breeding season this year. Not only were there 29 percent fewer breeding pairs ---213 in 1952 and 152 in 1953---, but also the total number of goslings observed decreased 20 percent, from 343 to 274. Average brood size (4.2) remained the same, as in Table VI.

Further examination of Table VIII shows that the decrease in total geese observed between July of 1952 and 1953 was primarily from moulting groups on the Snake and Bear River drainages. These birds evidently moved out of their respective drainages in the State following the breeding season. The State-wide increase in geese in May of 1953, then, was composed of non-breeding pairs and groups; evidence, perhaps of past and future productivity, but of no direct bearing on goose production in 1953.

Table V. - Duck Brood Counts in Wyoming - July, 1953

Drainage	No. Broods	No. Ducklings	Av. Brood Size
Green River	19	115	6.1
Snake River	12	68	5.7
Bear River	10	69	6.9
Salt River	6	31	5.2
Wind River	12	69	5.8
Belle Fourche	10	58	5.8
North Platte	123	662	5.4
Powder-Tongue	21	123	5.8
Great Divide Basin	26	168	6.5
Total	239	1,363	5.7

Table VI. - Goose Brood Counts in Wyoming - July, 1953

Drainage	No. Broods	No. Goslings	Av. Brood Size
Green River	22	91	4.1
Bear River	17	78	4.6
Snake River	7	27	3.8
North Platte	27	108	4.0
Total	73	304	4.2

Table VII. - Canada Goose Breeding Ground Inventory - 1953

Drainage	Non-Breeding Pairs	Breeding Singles *	Birds in groups	Total Birds	Density of geese per Mi. of stream **
Bear River	105	40	79	369	7.0
Snake River	112	50	182	506	5.3
Yellowstone National Park ***	54	29	14	180	3.0
North Platte	125	86	87	509	1.8
Green River	72	46	100	336	1.3
Total	468	251	462	1,900	
Adjusted Totals ****	384	335	462	1,900	

* To obtain total birds, geese in this column were doubled.
** Stream length determined by 10-mile straight line segments in nesting habitat.
*** Estimated 75 percent coverage of nesting habitat.
**** Number of breeding singles adjusted upward on basis of 25 percent nest mortality at time of taking May inventory.

Table VIII. - Comparison of Geese observed by Aerial Count on Identical Areas in May and July, 1953

		May					July				
	Drainage	Pairs	Singles *	Groups	Young	Total	Pairs **	Singles	Groups	Young	Total
***	Green River	30	28	72	16	204	23	-	-	91	137
***	Bear River	71	36	57		271	17	-	3	78	115
***	Snake River	68	34	170		374	7	-	120	27	161
****	N. Platte River	125	86	87		509	27	1	1,535	108	1,698
	Total	294	184	386	16	1,358	74	1	1,658	304	2,111

* A single goose was counted as a mated pair in May.
** Included pairs with broods.
*** Sample of drainage.
**** Entire drainage.

Table IX. - Comparison of Geese Observed by Aerial Count on Identical Areas

In May 1952 and 1953

Drainage	1952 Pairs	1952 Singles *	1952 Groups	1952 Total	1953 Pairs	1953 Singles *	1953 Groups	1953 Total
Green River	89	91	-	360	65	47	100	324
Bear River	95	62	47	361	98	48	79	371
Snake River	75	60	62	332	105	57	182	506
Total	259	213	109	1,053	268	152	361	1,201

* A single was considered a mated pair in May.

In July 1952 and 1953

Drainage	1952 Pairs*	1952 Singles**	1952 Groups	1952 Young	1952 Total	1953 Pairs*	1953 Singles**	1953 Groups	1953 Young	1953 Total
Green River	22	1	-	89	134	23	-	-	91	137
Bear River	15	1	231	47	309	17	-	3	78	115
Snake River	14	-	358	64	450	7	-	120	27	161
Sweetwater River	1	-	-	4	6	4	-	-	16	24
Pathfinder Reservoir	19	-	720	76	834	13	-	781	50	857
Seminoe Reservoir	15	-	120	63	213	3	-	83	12	101
Total	86	2	1,429	343	1,946	67	-	987	274	1,395

* Parents with broods were counted as pairs in July.

** A single goose in July was counted as a single bird.

Summary

Weather in Wyoming was characterized this year by a warm spell early in the spring followed by cold, moist weather throughout much of April and May. Water conditions during the early spring were slightly below average and drought conditions prevailed in some sections of the State by early summer. By July, a critical shortage of surface water existed throughcut the Northwest and Central portions of the State.

Aerial surveys during May resulted in an estimate of 13,725 breeding pairs in the State plus 16,789 birds which were classified as migratory. This was about the same number as were present during 1952. Mallards represented 62 percent of the breeding pairs with gadwall, green-winged teal and merganser comprising the remainder.

The aerial surveys also resulted in an estimate of 1,900 Canada geese, of which 670 represented the nesting population. This represented a 15 percent increase over 1952.

No estimate on total duck production was obtained although comparisons between 1952 and 1953 indicate that production decreased considerably this year.

Goose production studies indicated that the average brood size was identical with last year, although there was a 25 percent decrease in birds produced in all areas as compared to 1952.

The Fall flight of ducks from Wyoming this year will be considerably below last year and the flight of geese will be about 25 percent less.

COMPARISON OF AIR AND GROUND WATERFOWL COUNTS ON IRRIGATED LAND IN NORTH-CENTRAL COLORADO

1951, 1952 and 1953

Jack R. Grieb

Introduction

The final results of this 3-year study are given in summary form. The same study area and methods used during past years were retained again in 1953 to determine, principally, whether the air-to-ground ratio varies between years for the same observer. A complete description of area and methods is given in Waterfowl Populations and Breeding Conditions, Summer 1952.

Results

Aerial breeding-pair counts in the Fort Collins area are best taken during late April, May, and early June for it is during this time that most territories are still active. The total counts of territories, by coverage, for 1951, 1952 and 1953 are tabulated in Table I. This table also lists the air-to-ground ratio for each coverage, and gives the result of the chi-square test. Thus, it was determined that average air-to-ground ratios found each year were consistent, being 2.23 for 1951, 1.52 for 1952, and 1.43 for 1953. Since the 1952 and 1953 study was conducted by the same observer, then it was desired to test whether a significant difference exists between ratios for the same observer between years. This was done by the "t" test comparing the 1952 average (1.52) with that of 1953 (1.43) resulting in $t = .728$, $t_{.01} = 3.707$ (6 degrees of freedom). Thus, there was no significant difference between counts made by the same observer for the two years. Combining the two year ratios gives an average ratio of 1.49 which can be used in correcting breeding-pair counts for this particular observer. The difference between the 1951 and 1952-53 ratios were caused by using different air observers.

The various habitat types were further analyzed to determine whether individual types also had a consistent ratio. This analysis revealed that 4 types were consistent in 1951 and 6 types were consistent for 1952 and 1953 combined (Table II). Therefore, on those types wherein the ratio was found to be consistent it would be possible, given the same observer, to multiply the results of an air coverage of a given type by the ratio for that type to obtain an estimate of the ground count.

As can be noted in Table II, the ratio not only varies in size between the two years, but also some types which were consistent one year were not the next. This can be attributed to the difference in observers.

The general trend for all three years of study was that aerial counting was easier on those areas where high-growing vegetation was not present to interfere with the observations (small lakes and ponds, large lakes, irrigation canals and irrigation ditches); and most difficult on the habitats with heavy permanent cover (creeks and drains, river and sloughs).

Table I. - Comparison of Air and Ground Counts by Coverages, 1951, 1952 and 1953

Comparison	Date	Observed Territories		Ratio
		Ground	Air	Ground to Air
	1951			
Air II; Ground IV	Mid-May	78	161	2.064
Air III; Ground VII and VIII (average)	Late June	64	143	2.093
Air IV; Ground IX	Mid-July	40	101	2.525
Average Ratio				2.231
Chi-square = .8487 Good fit - average ratio may be used.				
Chi-square .5 = 1.386 2 D.F.				
	1952			
Air I; Ground II	Late April	96	149	1.55
Air II; Ground III	Early May	86	130	1.51
Air III; Ground IV	Late May	67	119	1.78
Air IV; Ground V	Early June	71	104	1.46
Air V; Ground VII	Early July	60	80	1.33
Average Ratio				1.52
Chi-square = 1.704 Good fit - average ratio may be used.				
Chi-square .5 = 3.357 4 D.F.				
	1953			
Air I; Ground I	Late April	115	171	1.49
Air II; Ground II	Mid-May	93	142	1.53
Air III; Ground III	Mid-June	60	77	1.28
Average Ratio				1.43
Chi-square = .756 Good fit - average ratio may be used.				
Chi-square .5 = 1.386 2 D.F.				
Average Ratio 1952-1953				1.49
Chi-square = 2.690 Good fit - average ratio may be used.				
Chi-square .5 = 6.346 7 D.F.				

Table II. - Air-to-Ground Comparison by Habitat Types, 1951 compared to 1952 and 1953

Habitat Type	Average Ratio Ground to Air		Chi-Square Calculations			
			1951		1952-53	
	1951	1952-53	X^2	X^2 .5(2 DF)	X^2	X^2 .5(7 DF)
Large Lakes	2.36	1.48	.712*	1.386	14.15	6.346
Small Lakes and Ponds	1.82	.96	.922*	1.386	6.274*	6.346
Irrigation Canals	1.36	1.35	.838*	1.386	4.797*	6.346
Irrigation Ditches	2.30	1.54	.197*	1.386	4.254*	4.351 (5 DF)
Rivers	5.27	1.80	**	**	1.875*	6.346
Creeks and Drains	**	2.09	**	**	.926*	2.366 (3 DF)
Sloughs	2.96	2.25	1.932	1.386	5.988*	6.346

* Indicates a good fit -- average ratio can be applied.
** Insufficient data.

Sources of Variation between 1951 and 1952-53

As mentioned previously, the air-to-ground ratio differed between 1951 and 1952-53. This was apparently caused by using a different observer for each of the two trials. The first year all aerial observing was done by the writer, while the second and third year counts were made by Erwin L. Boeker. The writer had previously done no aerial counting of waterfowl, and had very little flying experience. Mr. Boeker, on the other hand, was a capable pilot with experience in aerial census. Obviously, experience is one of the prime factors in the differences between the ratios obtained for each year.

It is possible to point out where experience helps in counting. By referring to Table II, it may be seen that without exception Mr. Boeker's air-to-ground ratio was much smaller than the writer's for each habitat type. However, the differences were larger on those types with heavy cover as river, and creeks and drains. Therefore, it is possible to conclude that an experienced observer will see an even greater percent of birds on those types with dense cover than will an inexperienced observer.

Experience also plays an important part in observing all species of ducks. This is emphasized by Table III, which shows the percent of ground-counted species seen from the air. Although the difference between mallard-like ducks was not great for the three years, only 8 percent of the teals were observed in 1951 as compared to 59 percent in 1952, and 58 percent in 1953.

Table III. - Comparison of air-to-ground Observation of Ducks, 1951, 1952 and 1953

Year	Percent of Ground Counted Birds Seen from the Air	
	Mallard-like	Teals
1951	55	8
1952	64	59
1953	62	58

Conclusions

From the foregoing analysis and discussion, it is possible to draw the following general conclusions:

1. A trained observer is essential to the success of aerial waterfowl census such as described.

2. Aerial counts of breeding-pairs on irrigated land types can be corrected to compare to ground counts.

3. Aerial counts for most habitat types can be corrected for ground totals.

4. The same observer will count about the same percentage of total birds from the air each year.

5. Experienced observers will observe a greater percentage of birds on types with dense cover than inexperienced observers.

6. Experienced observers will observe a greater percentage of teals than inexperienced observers.

WATERFOWL BREEDING GROUND SURVEY IN COLORADO, 1953

Jack R. Grieb, Harold M. Boeker, John R. Tester,

Erwin L. Boeker and Ladd G. Frary *

Introduction

As in past years, the Colorado Game and Fish Department has again cooperated with the Fish and Wildlife Service in determining the status of waterfowl in Colorado. This is the first year of a proposed 5-year waterfowl plan which, it is hoped, will eventually place all waterfowl nesting areas in the State under control. Thus, we may deliver the results of our surveys to the Fish and Wildlife Service in terms of estimates of total breeding-pairs and production for Colorado. Previously such reports gave only trend results, and converting to the new method has involved a great deal of change in thinking, planning, and setting up the correct type of sample routes to effect such conversion. Despite this, some progress has been made toward the final goal, so that we are now able to give total production estimates for 6 of the 8 major breeding areas in Colorado.

This final report, therefore, cannot give total State breeding-pairs and production for all areas. It will include totals of those areas for which they are available, and give general results for all other areas.

Methods and Study Areas

Survey methods used in 1951 and 1952 were retained in 1953, except where physiography and size of area necessitated modification. Thus, the general procedure was determination of the breeding population and, later, production, chiefly by breeding-pair and brood counts on randomly selected samples for all breeding grounds surveyed. The data so obtained have been used in estimating total breeding populations and production.

A summary of sampling methods and areas is given in Table I.

Weather and Water Conditions

Climatological data and phenological records indicate that Colorado experienced a mild, dry winter resulting in smaller accumulations of snow in the mountains this year. Run-off, when it did occur, was about two weeks later than normal and much reduced. The effect on waterfowl, especially on the western slope was twofold: (1) the birds could not reach their usual nesting areas in the higher elevations until later, because of the late storms and delayed run-off; (2) there was little flooding, and consequently fewer destroyed nests resulting in a smaller number of birds renesting this year.

* Grateful acknowledgement is made by the authors to Dr. Lee E. Yeager, Leader, Colorado Cooperative Wildlife Research Unit for valuable suggestions and cooperation; and, to Boyd Evison and Norman L. Hughes, who assisted in the collection of data.

Table I. - Waterfowl Breeding Areas and Samples, Colorado - 1953

Breeding Grounds	AREA			Sampling Method *
	Total Sq. Mi.	Sample Sq. Mi.	Percent of total	
North Park	611	55	9.0	Aerial
South Platte Valley	1,407	70	5.0	Ground and Aerial
Cache la Poudre Valley	343	36	10.5	Ground and Aerial
Yampa River Valley	220	22	10.0	Ground
Brown's Park	15	15	100.0	Ground and Aerial
White River Plateau	360	18	5.0	Ground
San Luis Valley	--	--	--	Aerial
South Park	--	--	--	Ground and Aerial

* Breeding-pairs and lone birds recorded by species and cover types in both ground and aerial coverages. Vehicle employed for ground travel; inaccessible areas walked. Cessna 170 and super-cub planes used for aerial work, crew consisting of pilot and observer. Identical forms used for recording data in both methods of coverage.

The eastern plains were affected differently. There, the mild winter and early spring was generally favorable to the early movement and nesting of ducks. It is believed that nesting was earlier this year than for the past 5 years as a result of these conditions.

Water levels were generally low in reservoirs, sloughs, and streams throughout the State. Intermittent potholes on the eastern plains, which in wet years furnish additional nesting habitat, have no water this year. Although not disastrous, this State-wide decrease in water has resulted in reduced production for all areas in 1953.

Discussion of Data

The current report on waterfowl conditions is, perhaps, more confusing than any previous report has been, or any future report will be. This is due to the two types of information that have been gathered this year--trend data, and total production estimates. As previously explained, some areas in the State still remain to be surveyed on the basis of total production. The only information obtainable from these areas, therefore, is a comparison of production on a trend basis. For this reason, each breeding ground will be discussed separately and in summary form, and all known production will be briefly summarized at the end of the report.

North Park

This high mountain park consisting of approximately 611 square-miles is located in the north-central portion of the Colorado mountains. An attempt has been made, this past summer, to determine the best waterfowl census method for this area. To accomplish this, a series of 4 flights of randomly selected transect routes were made, and 2 ground counts of selected areas over all habitat types represented in the Park. Comparison of these methods has revealed that: (1) Aerial breeding-pair counts are satisfactory; (2) aerial brood counts are unsatisfactory; and (3) ground brood counts will give a better estimate of production than aerial brood counts if a good sample of each habitat type is taken. The following report is based upon an aerial breeding-pair count and a later ground brood count. Admittedly, the sample on which the brood

estimates were made is small for some habitat types; however, future plans for study in this area include increasing the size of sample, and determining correction factors for time or season to adjust counts for the total production.

Estimates of total 1953 production in North Park reveal 5,675 breeding-pairs, and 3,736 broods with an average brood size of 6.12 resulting in the production of 22,864 young. Breeding-pair success is, thus, indicated as about 66 percent. No comparison of total Park production is available for past years.

Species composition of observed broods is listed in Table II. This list compares favorably with past years showing that the baldpate is again the most common producer with mallards second.

Table II. - Species Composition Observed Broods, North Park, August 4-6, 1953
(Not projected)

Species	No. Broods	No. Young	Average Brood Size	Percent Composition of identified young
Baldpate	60	360	6.00	36.2
Mallard	36	219	6.08	22.0
Gadwall	22	133	6.05	13.3
Pintail	22	131	5.95	13.1
Green-winged teal	10	65	6.50	6.5
Canvasback	4	24	6.00	2.4
Scaup	4	22	5.50	2.2
Shoveler	5	21	4.20	2.1
Redhead	3	16	5.33	1.6
B-w. or Cinn. teal	1	6	6.00	.6
Unidentified	73 *	472	6.47	--
Total	240	1,469	6.12	100.0
Tot. Est. Production North Park **	3,736	22,864	6.12	

* Lake John counted by air - no species identification (57 broods).
** Based on ground counts August 4-6, 1953, projected by habitat type and corrected for time of season when count was made.

South Platte Valley

The South Platte Valley, located in the northeast corner of the State, is composed mainly of habitat types typical of irrigated lands. Total land area under consideration amounts to 1,407 square miles of which 5 percent or 70 square miles were intensely studied from the ground.

Results from aerial breeding-pair counts along the South Platte River this spring, indicated about 50 percent more pairs in the area this year than during a comparable count in 1952. This striking increase did not carry over to the production of young. Apparently the early surplus of pairs were forced to move elsewhere to nest by the decrease in habitat which was noted during ground surveys.

Projected totals from the ground survey show that 1953 production for this area will be approximately 1,187 broods, with an average brood size of 6.7 young. Thus, it is estimated that 7,953 young will be produced in the irrigated portion of the Platte Valley this year. No comparable data are available for 1952; however, past studies indicate that current production is lower than usual.

Cache la Poudre Valley

The Cache la Poudre Valley is located directly east of the foothills in northern Colorado. Land use, in this area, is mainly irrigated farming; however, there are numerous lakes, reservoirs, and sloughs interspersed throughout the Valley proper. Total area of the Valley has been estimated at approximately 343 square miles of which 36 square miles were intensively studied by ground and air methods for a sample of 10.5 percent.

Spring breeding-pair numbers for 1953 (1601) were found to be about 56 percent greater than 1952 (1029), (Table III). This increase was caused mainly by greater numbers of mallards and blue-winged teals. However, final brood counts has revealed that the early reported increases did not hold true for production, for final figures indicate a decrease of 0.5 percent from 1952 (4821 young, 1953; 4850 young, 1952). This slight decrease is attributed to reduced habitat caused by lower water levels in all cover types ultimately resulting in a definite decrease in nesting success for all species (46.4 percent, 1953; 75.9 percent, 1952).

Table III. - Comparison of Waterfowl Breeding-Pairs and Production by Species, Cache la Poudre Valley, 1952 and 1953

Species	No. Breeding-Pairs		No. Broods		No. Young		Production Per sq. mi.	
	1952	1953	1952	1953	1952	1953	1952	1953
Mallard	781	1,181	515	543	3,306	3,506	9.64	10.22
B-w. teal	162	295	172	133	1,029	829	3.00	2.42
Cinn. teal	48	19	-	-	-	-	-	-
Redhead	-	10+	-	19	-	229	-	.67
Gadwall	38	67	-	19	-	114	-	.33
Pintail	-	29	9	-	48	-	.14	-
Baldpate	-	-	9	-	86	-	.25	-
Ruddy duck	-	-	19	-	67	-	.19	-
Unidentified	-	-	57	29	314	143	.92	.42
Total	1,029	1,601	781	743	4,850	4,821	14.14	14.06

Comparison of 1953 production with that of past years, as given in Table IV, shows very little difference between years. This uniformity exhibited in total production during the 4-year period is striking, and probably significant. In an area such as this which offers a variety of cover types for nesting ducks, it is possible that a saturation point can be reached in production. Analysis of the data indicates that there is a change in the nesting pattern by habitat types from year to year which seems to correspond to the difference in seasons.

Table IV. - Comparison of Waterfowl Production in the Cache la Poudre Valley, 1950, 1951, 1952 and 1953

Year	No. of Broods	No. of Young	Average Number Young per Brood
1950	772	4,441	5.7
1951	781	4,841	6.2
1952	781	4,850	6.3
1953	743	4,821	6.5

Yampa River Valley

The Yampa Valley is a long narrow floodplain and canyon extending from the headwaters of the Yampa River on the White River Plateau to its confluence with the Green River in northwest Colorado, a distance of 220 miles. The Valley varies from 1/4-mile in width in the canyons to about 10 miles in width shortly after its emergence onto the floodplain proper west of Steamboat Springs. The water table along the entire non-canyon portion of the Valley is high, and development of sedge and cattail marsh extensive. This habitat, plus the oxbow, drain, and meandering stream areas, constitutes the waterfowl breeding grounds found in the region.

Spring breeding duck populations were found to be about 15 percent less than in 1952. This difference occurred mainly in the decrease of cinnamon, blue-winged, and green-winged teal pairs. Projection of figures obtained on the study areas revealed a total of 1,500 breeding-pairs, with a subsequent production of 1,030 broods, resulting in 69 percent breeding-pair success in the Yampa Valley in 1953. Average brood size in 1953 was 6.5, resulting in a total production of 6,690 young compared to 8,670 for 1952 (Table V). This gives a decrease of 23 percent in duck production between the 2 years.

Goose production, on the other hand, was significantly increased in the Yampa Valley this year. The production figures from 1952 indicate that 40 broods and 136 young were produced, compared to the 1953 production of 90 broods and 540 young. Average brood size for Canada geese rose from 3.4 per brood in 1952 to 6.0 per brood in 1953. The increase in number of broods and birds per brood in the Yampa Valley in 1953 resulted in an increased goose production of 297 percent over that of 1952. This increased production was largely the result of favorable conditions on the nesting grounds, of which moderate spring run-off on the Yampa River played a major part. However, the increase may reflect the decrease evident in adjoining areas such as Brown's Park and the Green River.

Table V. - Total Waterfowl Production, Yampa River Valley, Colorado - 1952-1953

Species	No. Breeding Pairs 1952	No. Breeding Pairs 1953	No. Broods 1952	No. Broods 1953	No. Young 1952	No. Young 1953	Production Per Sq. Mi. 1952	Production Per Sq. Mi. 1953
Canada Geese	120	130	40	90	140	540	.64	2.45
Mallard	1,050	1,060	930	760	6,110	4,750	27.77	21.59
Cinn. & B-w. teal	270	140	170	60	870	340	3.95	1.55
G-w. teal	240	120	140	30	770	140	3.50	.64
Amer. merganser	120	100	80	110	670	1,030	3.05	4.68
Pintail	40	20	20	20	110	100	.50	.45
Gadwall	40	40	-	30	-	170	-	.77
Unidentified	-	-	20	20	140	160	.64	.73
Total								
Geese	120	130	40	90	140	540	.64	2.45
Ducks	1,790	1,500	1,360	1,030	8,670	6,690	39.41	30.41

Brown's Park

Brown's Park is primarily a heavily grazed, sagebrush-covered, mountain park, bisected by the Green River. It is located in extreme northwest Colorado, and both the park and river extend into the adjoining State of Utah. Waterfowl habitat, in Colorado is limited to the floodplain area along a 15-mile stretch of the river. Since this bottomland averages about 1 mile in width, available waterfowl nesting ground consists of approximately 15 square miles. Cattail and bulrush marsh, flooded hay meadows, and willow-bordered streams characterize the waterfowl habitat found in this region.

Water levels in Brown's Park were lower this spring than residents could ever remember. Fortunately, when the Green River reached its peak, these marshes were flooded. This appeared to occur too late, however, for nesting purposes, and most ducks in the park were loafing rather than attempting late nests. Thus, the 37 percent increase in breeding-pair numbers did not mean increased production. Rather, it was found that final duck production was 71 percent less this year than last. Total 1953 duck production was 407 young as compared to 1,422 in 1952 (Table VI).

Goose production, in Brown's Park, showed a large decrease in 1953. A total of 18 broods and 109 goslings were observed in 1952, compared to 9 broods and 51 goslings in 1953, for a 53 percent decrease in young this year (Table VI).

Table VI. - Total Waterfowl Production, Brown's Park, Colorado - 1952-1953

Species	No. Breeding-Pairs		No. Broods		No. Young		Production Per Sq. Mi.	
	1952	1953	1952	1953	1952	1953	1952	1953
Canada Geese	21	12	18	9	109	51	7.27	3.40
Mallard	121	196	91	20	668	144	44.53	9.60
Pintail	14	15	10	6	66	49	4.40	3.27
Gadwall	60	43	9	2	55	14	3.67	.93
Shoveler	7	20	1	0	1	0	.07	-
Teals	49	79	37	21	283	162	18.87	10.80
Redhead	35	11	18	2	131	15	8.73	1.00
Ruddy duck	5	8	7	0	37	0	2.47	-
Unidentified	0	0	27	5	181	23	12.07	1.53
Total								
Geese	21	12	18	9	109	51	7.27	3.40
Ducks	291	372	200	56	1,422	407	94.80	27.13

White River Plateau

One of the most important breeding areas in the State is the complex of high-country streams, lakes and beaver-dams. When it is considered that there are about 20,000 square miles of National Forest land in the higher elevation of Colorado, it can be readily understood that production, no matter how small per square mile, could become considerable when projected over this vast area.

The study of waterfowl on the White River Plateau was initiated purposely to determine, in at least one area, the amount of production for the high altitudes. Although it is not considered typical of all high-country types, the 6.8 young produced per square mile in 1952 and the 6.1 young produced per square mile in 1953 on this area emphasizes that the potential from this hither to unstudied type could approach 100,000 young annually. Actual production, however, is yet to be determined, and will not be considered until better estimates of both production per square mile, and the extent of arca are obtained.

Table VII lists the results from the 1953 study and compares it to that of 1952. During the 1953-season there was a decrease of 17 percent in breeding-pairs which was borne, for the most part, by green-winged teals. This reduction in breeding population was partially compensated for by an increase in the number of young per brood. Production for 1953 was 10 percent below that of 1952. This means that 2,180 young were produced on 360 miles of comparable type rather than 2,440 as in 1952.

One important reason for the reduction in number of broods and young was the 2-week delay in run-off from this high-country. Undoubtedly many pairs which would have nested here were discouraged by the lateness of season and attempted to nest elsewhere.

Table VII. - Comparison of Waterfowl Pairs and Broods on the White River Plateau, Colorado, 1952 and 1953

Species	No. Breeding-Pairs 1952	1953	No. Broods 1952	1953	No. Young 1952	1953	Production Per Sq. Mi. 1952	1953
Mallard	480	440	380	360	2,040	2,080	5.7	5.8
G-w. Teal	100	20	60	20	400	100	1.1	.3
Lesser scaup	-	20	-	-	-	-	-	-
Total	580	480	440	380	2,440	2,180	6.8	6.1

San Luis Valley

In general, water levels in the San Luis Valley were far below those present in 1952. This can be attributed directly to the low amount of winter precipitation on drainages entering the Valley as compared to 1952. Consequently, nesting habitat was greatly reduced, and nesting pairs were found to be concentrated on permanent water areas.

Results of the 1953 aerial survey are given by summary form in Table VIII. Unfortunately, no measured data are available for the 1951 count when low water levels were present in the Valley as a result of a prolonged drought. The 1949, 1950, and 1952 results are given for comparison.

A gross comparison of 1952 and 1953 production shows a decrease of approximately 43 percent in 1953. The average number of young per brood shows a decrease of 18 percent. Beyond a doubt, the low water levels resulting in limited nesting habitat are responsible for the decrease in production.

Table VIII. - Comparison of Production in the San Luis Valley, 1949, 1950, 1952 and 1953

Year	Number of Broods	Number of Young	Average Number of Young Per Brood
1949	57	353	6.20
1950	100	522	5.22
1952	115	809	7.03
1953	81	462	5.73

South Park

Intensive studies of waterfowl production, and the establishment of permanent aerial transects will not begin in this area until 1954. The only information available from South Park this year, therefore, is the results of a preliminary ground survey and one aerial census of breeding-pairs. These are listed in Table IX revealing that at least 431 pairs will currently attempt nests in the Park. This is believed to be lower than past years due to less water area in the Park in 1953.

Table IX. - Total Territories by Habitat Type and Species, South Park, Colorado 1953

Species	Small Lakes	Large Lakes	Sloughs	Creeks & Rivers	Meadows	Total
Mallard	54	40	32	94	22	242
Gadwall	17	12	14	3	-	46
Pintail	6	2	10	8	2	28
Cinn. teal	6	4	15	-	-	25
B-w. teal	4	4	11	9	2	30
G-w. teal	1	3	4	8	2	18
Shoveler	4	8	2	2	-	16
Baldpate	4	7	2	-	-	13
Redhead	4	5	4	-	-	13
Total	100	85	94	124	28	431

Summary

A mild winter in Colorado resulted in decreased snow cover in the higher elevations of the State. Late storms occurred over the State in April and May. These storms had little effect on the eastern slope breeding areas, but delayed breeding activity in western slope areas by one to two weeks. Eastern slope nesting appeared to be the earliest in the past 5 years.

Water levels were generally low in reservoirs, sloughs, and streams throughout the State. Intermittent potholes on the eastern plains, which in wet years furnish additional nesting habitat, have no water this year. Although not disastrous, this State-wide decrease in water has resulted in reduced production for the State in 1953.

All data gathered in 1952 and 1953 are briefly summarized in Table X. From those areas which have data for both years, it was estimated that there were 3,690 breeding-pairs of ducks in 1952 compared to 3,971 for the same areas during the current year. This is an increase of about eight percent in breeding-pairs over 1952. However, brood counts on the same areas reveal that production is down about 19 percent between the two years (1952 - 17,383 young; 1953 - 14,098 young). This reduction was caused by a definite decrease in water areas which vitally affected the extent of available nesting cover. Considering the six areas from which estimates of total production were possible, it was determined that those areas produced an estimated 44,915 young ducks this year. It is not possible at this time to determine what percent of total this figure represents.

Estimates of goose production in the Yampa Valley and Brown's Park, for 1952 and 1953, show sizable increases in the number of goslings produced this year. Although breeding-pair numbers were not different between the two years, nesting success was much better, and more goslings were brought off per brood in 1953. Final estimates of goose production reveal 591 goslings in the Yampa Valley and Brown's Park in 1953 compared to 249 in 1952, for an over-all increase of about 137 percent.

Table X. - Summary of Colorado Duck and Goose Breeding-Pair and Production Surveys, 1952 and 1953

Area	Total Breeding-Pairs 1952	Total Breeding-Pairs 1953	Pairs Per Square Mile 1952	Pairs Per Square Mile 1953	Total Est. Broods 1952	Total Est. Broods 1953	Average Brood Size 1952	Average Brood Size 1953	Total Young Produced 1952	Total Young Produced 1953	Production Per Square Mile 1952	Production Per Square Mile 1953
DUCKS												
North Park.	-	5,675	-	9.3	-	3,736	6.7	6.1	-	22,864	-	37.4
South Platte Valley	-	-	1.1*	1.7 *	-	1,187	-	6.7	-	7,953	-	5.6
Cache la Poudre Valley	1,029	1,619	3.0	4.7	781	743	6.3	6.5	4,851	4,821	14.1	14.1
Yampa Valley	1,790	1,500	8.1	6.8	1,360	1,030	6.4	6.5	8,670	6,690	39.4	30.4
Brown's Park	291	372	19.4	24.8	200	56	7.1	7.3	1,422	407	94.8	27.1
White River Plateau	580	480	1.6	1.3	440	380	5.3	5.7	2,440	2,180	6.8	6.1
South Park	-	431	-	-	2**	-	-	-	-	-	-	-
San Luis Valley	-	-	-	-	-	-	-	-	-	-	-	-
GEESE												
Yampa Valley	120	130	.5	.6	40	90	3.4	6.0	140	540	.6	2.5
Brown's Park	21	12	1.4	.8	18	9	6.1	5.7	109	51	7.3	3.4
Geese Total and Average	141	142	.6	.7	58	99	4.3	6.0	249	591	1.1	2.5

* Results of aerial trend counts.

** No estimates of total production are available at this time.

WATERFOWL BREEDING GROUND SURVEY IN NORTH DAKOTA

Bernard A. Fashingbauer *

Introduction

The waterfowl breeding ground investigations conducted by the North Dakota Game and Fish Department in 1953 represent the 6th consecutive State-wide survey which has been carried on within the State.

The purpose of these waterfowl surveys is to obtain information relative to the spring migration, the breeding population and the resultant production which, when compared with similar data secured in other years, will determine the trends in the various aspects of waterfowl populations.

With the exception of the assistance of an aerial observer from the Office of River Basin Studies of the Fish and Wildlife Service, all of the data were secured by personnel of the Pittman-Robertson Division of the State Game and Fish Department.

Sampling Methods and Area Covered

Techniques employed in censusing the 1953 breeding waterfowl population were identical to those used in 1952. Both aerial and ground censuses were conducted.

The aerial census was conducted along 18 transects which traverse the State in an east-west direction and are located 12 miles apart in a north-south direction.

The ground census was conducted along eight transects which traverse the State in a north-south direction. The east-west distance between the ground transects varies with the location of suitable roads.

In both the aerial and ground inventories, all the game species of waterfowl observed within a 1/4-mile strip are tallied and geographically located.

Each year the breeding pair census is begun immediately after the apparent completion of the spring migration. In 1953 the aerial and ground censuses were conducted concurrently in the period May 12 to May 25, inclusive.

Aerially observed duck densities obtained by a random sample (slightly more than 2 percent) of the entire State serve as the basis in determining the breeding population index. The ground census provides information relative to the species composition and sex ratio of the waterfowl population. The sex ratio data permit the computation of a corrective factor to compensate for hens on the nest which are not observed during the aerial census. By applying the detailed information obtained during the ground census to the mass aerial data, the latter becomes more useful and reliable as an indication of the minimum breeding waterfowl population. The ground census is also used to tally available water areas.

* James E. Sjordal, Field Biologist, assisted in compiling brood data.

Weather and Water Conditions

The drought which began in the spring of 1952 continued throughout the summer and winter. Conditions appeared critical as the spring of 1953 approached. In March the precipitation was more favorable throughout the State, with the exception of the eastern portion. The spring break-up was gradual however and no serious flooding occurred.

April was characterized by abundant precipitation. Heavy wet snows which occurred during the latter portion of April and the early part of May were accompanied by freezing temperatures during the night. Water areas which had just recently opened were again frozen. The wet snows of early May were followed by heavy rains which fell throughout most of the month, causing it to be the wettest May since 1897. Temperatures during this critical waterfowl month were below normal. These unfavorable weather conditions were detrimental toward the early nesting waterfowl, particularly mallards and pintails.

Abundant precipitation occurred throughout the first half of June and the water areas, partially depleted by the drought of the previous summer, returned to their normal level. Extremely heavy rains about the middle of June flooded a large number of the low meadowlands. At this time many of the mallards and pintails were re-nesting and the other species of ducks were well underway in their initial nesting attempts.

Moderate drought conditions prevailed during the remainder of the summer and during this period the peak of the duck hatch occurred. Sufficient water was available to ensure the success of this late hatch.

Breeding Population Trends

The 1953 breeding waterfowl population was estimated to be approximately 20 percent greater than that of the previous year and closely approximated the average population of the previous 5 years. Data from the 1953 ground survey indicated that the aerially observed duck population must be increased by 20.9 percent to account for absent females. Indices to individual species populations were obtained by applying the species composition as obtained in the ground surveys to the corrected State-wide population index.

It is very probable that the 20 percent indicated increase in the 1953 breeding waterfowl population should be tempered somewhat.

At the time of the 1952 census the vegetation was considerably more advanced than in 1953, rendering the observations of duck densities more difficult. Furthermore the 1953 census was carried out with almost a complete change in personnel from that of the previous year's survey.

Success of the Season

The determination of production success in North Dakota is based upon two types of surveys:

1. Brood counts conducted but once or twice each season throughout an extensive portion of the more favorable waterfowl habitat referred to as the Coteau Region.

2. An intensive survey conducted frequently on a more restricted area within the same general region.

Brood counts conducted along the extensive transects in 1953 indicated considerably less reproduction success than in 1952. The intensive study on the smaller area however indicated a slight increase in production. General observations conducted throughout the State indicate that waterfowl production in 1953 at best equalled and more likely was less than the previous year.

A total of fifteen brood censuses conducted within the period July 3 to September 2 along the 58-mile long transect used for intensive study, indicated that the peak of the waterfowl hatch in 1953 occurred about the middle of August. This is approximately 3 to 4 weeks later than the peak as established in recent years.

By classifying broods as to age and size and plotting their approximate location along this transect, a relatively accurate indication was obtained of the total production occurring within the sampled area. This method eliminated a large part of the duplication encountered in the tally of broods and indicated a total production of 173 broods, or about 12 broods per square mile, along the 1/4-mile wide transect. Table I V indicates the species composition and average size of the broods located along this transect.

A tally on July 16 revealed 157 water areas, totalling approximately 390 surface acres, along the census route.

Detailed information regarding the total production along this route for previous years is not available.

Summary

Surveys disclosed that the 1953 breeding waterfowl population in North Dakota was approximately 20 percent greater than in 1952 and closely approximated the average population index for the previous five years.

The indicated 20 percent increase probably should be tempered somewhat due to the different phenological conditions and the observers for the two years.

Blue-winged teal, pintail and mallard again ranked well above the other ducks in the breeding waterfowl population.

In relation to the previous 5-year index, the blue-winged teal, gadwall, baldpate and scaup displayed a favorable increase, whereas the pintail, shoveler and ruddy duck showed a significant decrease. There was also indicated a considerable reduction in the breeding coot population. The mallard, redhead and canvasback population approximated the previous 5-year average.

At the onset of the breeding season water conditions were very favorable.

The weather was very unfavorable during the first portion of the nesting season, resulting in a 3 to 4 week delay in the peak of the hatch. Mallards and pintails were particularly adversely affected and reproduction of these species in 1953 is believed to have been poor.

Average brood size for all species appears to have been favorable.

Considering the reproduction of the duck population as a whole, the success this season was at best equal to the previous year and probably was somewhat less.

Summary of Summer's Banding Operations

Banding operations were begun the first of August. The drive trap method was employed to capture the flightless ducks. Emphasis was placed upon the banding of locally raised birds and of the 489 ducks banded within the period August 1 to September 15 approximately 91 percent were of this category. Forty-seven percent of all the ducks banded were males.

Blue-winged teal comprised approximately 88 percent of the total number of ducks banded. The relative success experienced in banding blue-winged teal results from the adaptability of this species to driving and to the abundance of these birds in the State.

A species list of the birds banded is shown below:

Species	No. Banded	Species	No. Banded
Blue-winged teal	432	Green-winged teal	5
Shoveler	16	Canvasback	1
Gadwall	19	Ruddy duck	1
Redhead	9	Coot	10
Pintail	6		

Table I. - Results of the 1953 Aerial Survey of Breeding Waterfowl in North Dakota as Compared with that of 1952

Transect No.	Square Mile in Sample	Total Ducks Observed		Ducks Per Square Mile	
		1952	1953	1952	1953
1	78.0	1,076	1,474	13.8	18.9
2	80.0	995	1,162	12.4	14.5
3	79.5	912	1,659	11.5	20.9
4	79.5	852	1,929	10.7	24.3
5	80.0	982	1,728	12.3	21.6
6	80.7	1,381	2,072	17.1	25.7
7	83.0	831	1,905	10.0	22.9
8	83.0	1,121	1,189	13.5	14.3
9	84.0	1,813	1,737	21.6	20.7
10	85.0	1,300	1,703	15.3	20.0
11	85.0	1,091	1,432	12.8	16.8
12	85.0	828	972	9.7	11.4
13	86.0	879	1,157	10.2	13.5
14	86.0	789	790	9.2	9.2
15	87.7	1,384	1,416	15.8	16.4
16	89.0	964	1,136	10.8	12.8
17	90.0	1,957	1,111	21.7	12.3
18	89.0	1,086	963	12.2	10.8
Total	1,510.4	20,241	25,535		
Average				13.4	17.1

Table II. - Results of the 1953 Ground Survey of Breeding Waterfowl in North Dakota

Transect No.	Sq. Mi. in Sample	WATER AREAS		WATERFOWL		
		No.	Surface Acres	Total Ducks Per Square Mile	Breeding Pairs* Per Square Mile	Coots Observed
I	59	130	181	9.8	5.5	20
II	60	185	232	7.7	4.7	12
III	58	361	376	11.9	7.4	112
IV	58	588	938	19.3	11.5	165
V	61	364	1,302	20.9	12.1	93
VI	52	483	261	8.8	5.3	5
VII	50	392	168	6.6	4.2	97
VIII	55	254	158	2.6	1.4	29
Total	453	2,757	3,616			533
Average				10.9	6.5	

* The number of breeding pairs is based upon the assumption that each male observed represents a breeding pair.

Table III. - Summary of the 1953 Breeding Waterfowl Survey Compared with Previous Years

INDICES TO TOTAL BREEDING DUCKS

Species	Average Index 1948 to 1953	1952 Index	Percent	1953 Index	Percent	Percent Change of 1953 Index from Average	Percent Change of 1953 Index from 1952
Mallard	195,496	163,792	15.2	202,739	15.2	+ 3.7	+ 23.7
Pintail	392,588	288,470	28.3	268,564	21.9	-31.6	- 6.9
Blue-winged teal	473,874	446,151	32.0	555,851	34.0	+17.2	+ 24.5
Green-winged teal	-	7,334	0.6	3,218	0.2	-	- 56.1
Gadwall	88,753	84,341	5.6	120,093	7.2	+35.3	+ 42.3
Baldpate	28,101	28,114	2.0	31,888	2.0	+13.4	+ 13.4
Shoveler	152,365	92,897	7.0	114,973	7.3	-24.5	+ 23.7
Total Puddlers	1,331,177	1,111,099	90.7	1,297,326	88.7	- 2.5	+ 16.7
Redhead	40,497	29,336	2.3	40,372	2.4	- 0.3	+ 37.6
Canvasback	30,877	29,336	2.8	31,303	2.1	- 1.4	+ 6.7
Scaup	40,887	33,003	2.8	77,234	5.8	+88.8	+134.0
Ringneck	T	T	T	T	T	-	-
Bufflehead	T	T	T	T	T	-	-
Ruddy duck	21,355	18,335	1.4	13,604	0.9	-36.2	- 25.8
Total Divers	133,616	110,010	9.3	162,513	11.3	+21.6	+ 47.7
Total Ducks	1,464,793	1,221,109	100.0	1,459,839	100.0	- 0.3	+ 19.5
Coot (1951 to 1953)	945	931		533		-43.5	- 42.7

INDICES TO WATER CONDITIONS

Average Index 1950-1953	1952 Index	1953 Index	Percent Change of 1953 Index from Average	Percent Change of 1953 Index from 1952
509,293	279,027	429,643	- 15.6	+ 44.6

Table IV. - Indicated Minimum Total Production Occurring within a Transect 1/4 Mile Wide and 58-Miles Long Located in the Coteau Region of North Dakota

Species	No. of Broods	Average Brood Size *	Basis
B-w. teal	64	7.6	60
Gadwall	25	6.7	24
Pintail	21	5.2	20
Mallard	15	6.7	14
Shoveler	9	5.9	9
Baldpate	2	9.0	2
G-w. teal	1	10.0	1
Redhead	8	7.1	7
Canvasback	1	6.0	1
Scaup	1	11.0	1
Ruddy duck	10	6.6	7
Unidentified	16	5.2	13
Total	173		159
Average		7.3	

* Represents broods of all ages.

WATERFOWL BREEDING GROUND SURVEY IN SOUTH DAKOTA

Ray Murdy and Maurice Anderson

Introduction

This report presents the findings of waterfowl breeding ground surveys in South Dakota during 1953. It covers the annual May inventory of the breeding population and a brood survey which was initiated this year to estimate brood production by mid-July. The information presented is a summary of that which was submitted to the U. S. Fish and Wildlife Service for use by the Director's Waterfowl Advisory Committee.

Breeding Population Survey

Methods of Survey

The breeding population survey consisted of two phases, a State-wide aerial survey and a ground survey in the better-than-average habitat in most the counties. The aerial survey provided estimates of the State-wide duck and water area densities and distribution. The ground survey contributed: 1) a correction factor, based on observed sex ratios, which was used to correct the aerially-observed duck densities to compensate for unobserved females on nests; 2) species composition data which were also used to estimate species densities; and 3) an estimate of the relative coot density. These aerial and ground surveys were made concurrently during the period from May 12 through May 18. Descriptions of these methods of survey appear below:

Aerial Survey

The aerial survey consisted of 16 east-west-1/4-mile wide transects spaced 12 miles apart, north to south. These transects totaled 5,720 linear miles, or 1,430 square miles, and were flown by 3 pilot-observer teams.

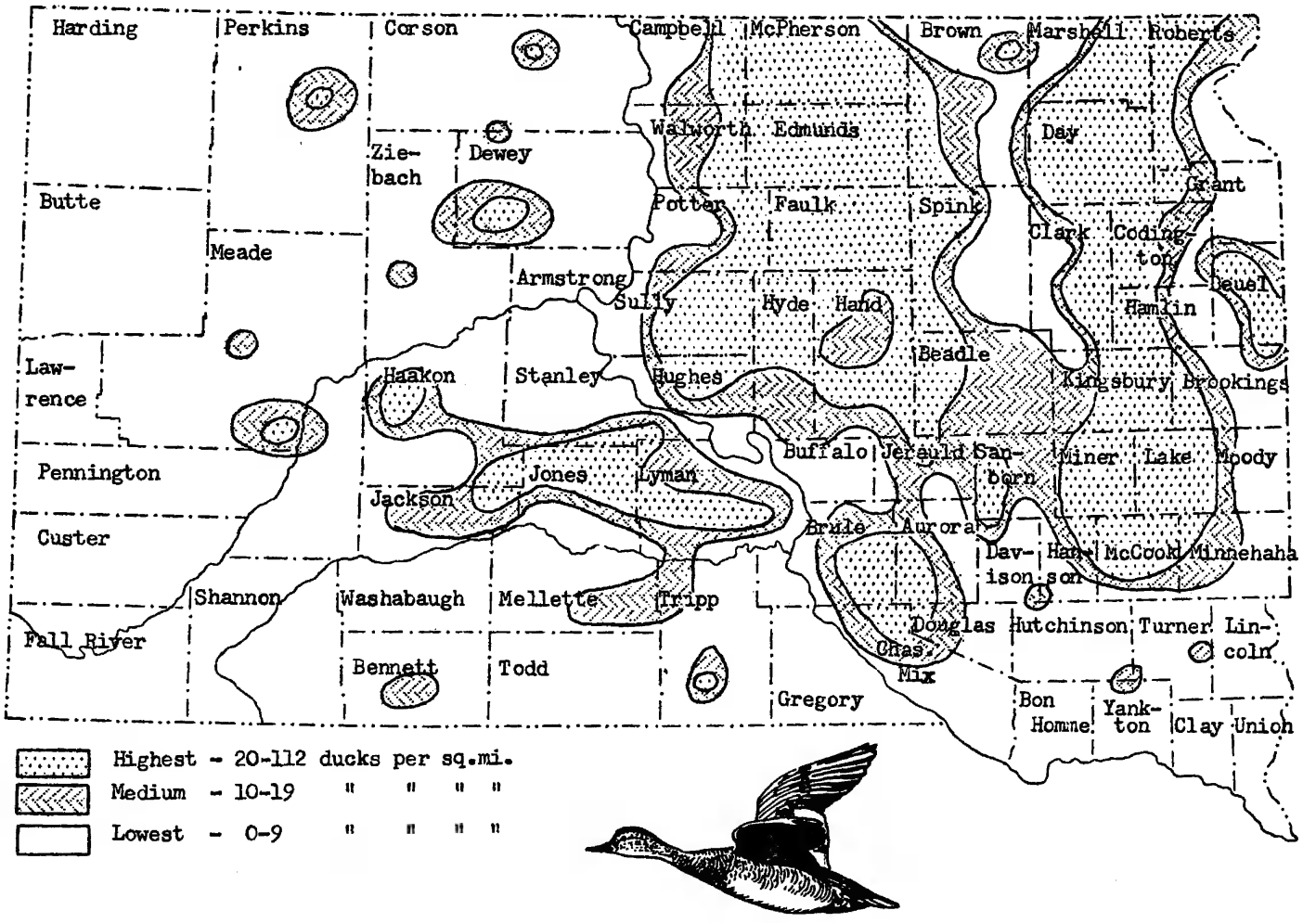
Ground Survey

The ground survey consisted of transects in 50 counties, run by 37 State game wardens. These transects totaled 2,232 linear miles of 1/4-mile ground transects, or 558 square miles of coverage.

Waterfowl Densities

A total of 17,435 ducks were observed on the 1,430 square miles of aerial transects, indicating an average State-wide observed density of 12.19 ducks per square mile. The correction factor for hens on nests, based on 8,419 males and 6,193 females observed on ground transects was 1.12. Correction of the observed density of 12.19 ducks per square mile by the correction factor of 1.12 indicates an average State-wide duck density of 13.65 birds per square mile. This is a minimum density because a considerable but undetermined portion of the ducks on aerial transects are not observed. From the density of 13.65 ducks per square mile and the 74,778 square miles in the State (excluding the Black Hills) the 1953 minimum breeding population was estimated to be 1,021,000 ducks.

Figure 1. Geographic Distribution of the 1953 Breeding Duck Population in South Dakota



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Waterfowl Density Trends

The density of breeding ducks in South Dakota was the same as in 1952. The estimates of 13.65 ducks per square mile, or 1,021,000 birds are a non-significant 2 percent greater than the 1952 estimates of 13.37 ducks per square mile or 1,002,000 birds. This trend of no change in the size of the breeding population occurred at a high level of duck density. The 1953 breeding population was 47 percent above the 1950-1952, 3-year average of 9.31 ducks per square mile, or 694,000 birds.

The coot breeding population was also similar in size to that of 1952. A total of 3,295 coots were observed on the ground transects, indicating an average density of 5.9 coots per square mile. This density is a non-significant 7 percent above that of 5.5 coots per square mile in 1952.

Waterfowl Distribution

Geographic Distribution

The geographic distribution of the 1953 breeding duck population is shown in Figure 1. This distribution is similar to that of 1952.

Physiographic Distribution

The physiographic distribution of the 1953 breeding duck population is indicated in Table I. The James River Valley contained 41 percent of the State-wide population; the Prairie Hills, 21 percent; the Missouri Plateau, 20 percent; the Missouri Hills, 17 percent; and the Minnesota Valley, 1 percent. This distribution is also similar to that of 1952 with the exception of a shift of about 4 percent of the State-wide population from the James River Valley to the Prairie Hills.

Species Densities and Percent Composition

Data pertaining to the estimates of species densities and percent composition are tabulated in Table II.

Species Densities

Species densities were estimated as the product of the percent composition and the average, minimum State-wide duck density. Substantial increases occurred in the densities of the shoveler (37 percent) and the redhead (24 percent); and a lesser increase occurred in the density of blue-winged teal (14 percent). Substantial decreases occurred in the densities of the canvasback (44 percent) and pintail (38 percent) with lesser decreases for the ruddy duck (21 percent) and mallard (12 percent). There was apparently no change in the density of the gadwall. Approximately 5 times as many scaup were observed as in 1952; but in this late-migrating species such an increase probably means that more migrating birds were present at the time of the survey.

Table I. - Physiographic Distribution of the Breeding Waterfowl Population and 1952-1953 Trends

Physiographic Division	Uncorrected Ducks/Sq. Mi.		Corrected * Ducks per Sq. Mi.			Estimated Minimum Population		Percent of State-wide Population		
	1952	1953	1952	1953	Change	1952	1953	1952	1952	Change
Minnesota Valley	8.95	9.45	10.92	10.58	- 3	14,000	13,000	1	1	0
Prairie Hills	17.61	23.41	21.48	26.22	+22	174,000	212,000	17	21	+ 4
James River Valley	19.41	19.81	23.68	22.19	- 6	445,000	416,000	45	41	- 4
Missouri Hills	18.08	20.45	22.06	22.90	+ 4	167,000	173,000	17	17	0
Missouri Plateau	4.24	4.73	5.17	5.30	+ 3	202,000	207,000	20	20	0
State-wide	10.96	12.19	13.37	13.65	+ 2	1,002,000	1,021,000	100	100	0

* Corrected from ground transect data to compensate for unobserved females on nests. Corrected by 1.22 in 1952 and 1.12 in 1953.

Table II. - Species Composition, Species Densities, and 1952-1953 Trends in the South Dakota Breeding Waterfowl Population

Species	Number of Males *		Percent Composition *			Species Densities ** Ducks per Square Mile		
	1952	1953	1952	1953	Change	1952	1953	Change
Blue-winged teal	3,894	4,093	43.62	48.71	+ 5.09	5.83	6.64	+ 14
Pintail	2,222	1,279	24.90	15.23	- 9.67	3.33	2.07	- 38
Mallard	1,318	1,084	14.88	12.90	- 1.98	1.99	1.76	- 12
Shoveler	635	798	7.11	9.50	+ 2.39	0.95	1.30	+ 37
Gadwall	272	258	3.05	3.07	+ 0.02	0.41	0.42	+ 2
Redhead	219	254	2.45	3.02	+ 0.57	0.33	0.41	+ 24
Ruddy	161	116	1.80	1.38	- 0.42	0.24	0.19	- 21
Scaup	87	447	0.97	5.32	+ 4.35	0.13	0.73	+461
Canvasback	62	33	0.69	0.39	- 0.30	0.09	0.05	- 44
Baldpate	43	40	0.48	0.48	0	0.06	0.06	0
Green-winged teal	10	7	0.11	0.08	- 0.03	0.01	0.01	0
Wood duck	3	8	0.03	0.10	+ 0.07	Tr.	0.01	-
Black duck	-	1	-	0.01	-	-	Tr.	-
Bufflehead	-	1	-	0.01	-	-	Tr.	-
Cinnamon teal	1	0	0.01	-	-	Tr.	-	-
Total	8,927	8,419	100.00	100.00		13.37	13.65	

* Data from ground transects.

** Product of percent species composition and the average, minimum, State-wide duck density.

Species Composition

Estimates of species composition were based on the number of males of each species observed on the ground transects. Blue-winged teal comprised 49 percent of the breeding duck population; pintails, 15 percent; mallards, 13 percent; shovelers, 10 percent; scaup, 5 percent; gadwalls, 3 percent; redheads, 3 percent; and ruddy ducks, 1 percent.

Water Conditions

Water Area Densities and Trends

At the start of the 1953 breeding season there were 22 percent more water areas than in 1952. A total of 10,597 water areas of all classes were recorded for the 1,430 square miles of aerial transects. This indicates an average, State-wide density of 7.41 water areas per square mile, compared with 6.09 in 1952.

Physiographic Distribution of Water Areas

The change in water area density in each physiographic division is shown in Table III. The increase in water area density was general over the State. There was a 10 percent increase on the Missouri Plateau; 25 percent increase in the James River Valley and Prairie Hills; a 34 percent increase in the Missouri Hills; and a 36 percent increase in the Minnesota Valley.

Table III. - Physiographic Distribution of Water Areas

Physiographic Division	Water Areas Per Square Mile		Percent Change
	1952	1953	
Minnesota Valley	8.32	11.32	+ 36
Prairie Hills	9.44	11.81	+ 25
James River Valley	10.41	13.03	+ 25
Missouri Hills	5.36	7.19	+ 34
Missouri Plateau	3.53	3.90	+ 10
State-wide	6.09	7.41	+ 22

Duck Brood Survey

Methods of Survey

A duck brood survey was initiated this year on a limited trial basis. This survey was limited to the portion of the State east of the Missouri River. It was based on the system of aerial transects used in the survey of the breeding population, but only the even numbered transects were flown. These 8 east-west, 1/4-mile wide transects were 24 miles apart, north-south, and totaled 331 square miles of coverage. They were flown during 2 and 1/2 hour periods in the early morning and late evening. When necessary, water areas were circled to permit better observation. The survey was made by 2 pilot-observer teams during the period July 13-19.

Duck Brood Densities and Distribution

The brood densities observed during this survey appear in Table IV. Over the East River Country as a whole there was an observed brood density of 0.71 broods per square mile. The highest observed density was in the Prairie Hills which averaged 1.04 brood per square mile. The James River Valley ranked second with 0.72 brood per square mile; and the Missouri Hills third with 0.48 broods per square mile. No broods were observed in the Minnesota Valley, but this was undoubtedly due to the effect of chance in the small sample.

Table IV. - Observed Duck Brood Densities in Eastern South Dakota

	Minnesota Valley	Prairie Hills	James River Valley	Missouri Hills	East River Totals
Sq. Miles Sampled	9.2	85.3	166.3	70.3	331.1
Broods Observed	0	89	113	34	236
Broods Per Sq. Mi.	0.0	1.04	0.72	0.48	0.71

It should be noted that the observed brood densities listed above are only indexes to brood densities. These indexes are considerably lower than the actual brood densities because a large portion of the brood present are not observed. At present these brood indexes are of little use in evaluating duck production because similar indices for previous years are lacking. Their only immediate value is to show the importance to over-all duck production of such areas as the James River Valley and Missouri Hills. The indexes in Table IV show that the highest brood density occurred in the Prairie Hills, and that the brood densities in the James River Valley and Missouri Hills were 70 percent and 46 percent as high as in the Prairie Hills. The areas of these physiographic divisions are: 8,107 square miles in the Prairie Hills; 18,784 in the James River Valley; and 7,579 in the Missouri Hills. The product of the area and the brood density index of each division is an index to the minimum number of broods in each division. Thus, at the time of the survey there were at least 8,400 broods in the Prairie Hills; 13,500 in the James River Valley; and 3,600 in the Missouri Hills. There were 61 percent more broods in the James River Valley and 57 percent fewer broods in the Missouri Hills than there were in the Prairie Hills. The James River Valley and the Missouri Hills combined contained more than twice as many broods as did the Prairie Hills.

WATERFOWL BREEDING GROUND SURVEY IN THE DAKOTAS

Jerome H. Stoudt

Introduction

A waterfowl breeding ground survey was conducted in North and South Dakota for the sixth consecutive year. Breeding pair transects were run by U. S. Game Management Agents Everett Sutton, Harry Jensen and Roe Meyer. Brood counts were run in July and August by Agents Harry Jensen, L. H. Harms, R. J. Meyerding and the author. Due to assignments in Canada, personnel was not available for intensive ground work to measure nesting success, breeding pair success or effects of weather and water conditions upon the breeding population.

Area Covered

The area covered was exactly the same as in 1951 and 1952. Brood counts were conducted from sun-up until 8 a.m. and from 5 or 6 p.m. until dark, depending on wind and weather conditions.

Weather and Water Conditions

When the early arriving pintails and mallards arrived in late March and April there were considerably fewer water areas than in 1952. This no doubt caused some mallards and pintails to move northward into Canada, which otherwise would have remained to nest in the Dakotas. However, from April 25 to May 1, an average of 7 inches of rain fell over much of the breeding area. This brought water levels up and increased the total number of water areas although many were of a very temporary nature. The number of water areas on transects were as follows:

	North Dakota	South Dakota
1952	1,732	1,091
1953	1,809	1,154

At the time of the breeding pair survey (May 11-18) it was estimated that from 50 to 70 percent of the water areas present would be dry in 2 or 3 weeks but an exceptionally wet spring and early summer helped to maintain most of these water areas throughout most of the brooding season.

On May 11 and 12 a spring blizzard descended upon most of the prairie breeding grounds from Alberta to and including South Dakota. Sub-freezing temperatures following the snow and the nesting season was retarded by 10 days or more. As a result broods were even later than usual and on September 20, numerous broods are still unable to fly.

NORTH DAKOTA

Breeding Population Trends

The breeding pair census in North Dakota yielded the following results:

Table I. - Breeding Pairs in North Dakota (146 Square Miles)

Species	Pairs / Sq. Mile			Percent Change from 1952	Species Composition		
	1951	1952	1953		1951	1952	1953
B-w. teal	9.7	8.6	8.4	- 2	32.7	31.0	33.6
Pintail	7.4	6.6	5.2	-20	25.0	23.7	20.0
Mallard	4.0	4.7	4.1	-13	13.4	16.8	16.2
Shoveler	2.5	1.5	1.3	-10	8.5	5.3	5.2
Gadwall	2.3	2.3	2.9	+27	7.9	8.2	11.6
Redhead	1.0	1.1	1.0	- 7	3.3	3.8	3.9
Canvasback	0.8	0.8	0.8	+10	2.6	2.7	3.1
Ruddy duck	0.7	0.9	0.2	-82	2.5	3.2	0.6
Lesser scaup	0.6	0.8	0.6	-27	2.0	2.8	2.4
Baldpate	0.5	0.4	0.4	- 3	1.8	1.6	1.7
All Others	0.1	0.1	0.2	+44	0.3	0.4	0.7
Total	29.8	27.8	26.2	- 9	100	100	100

The 1953 raw transect data indicates a loss of 1.6 pairs per square mile from 1952 and 3.6 pairs per square mile since 1951.

In general, all species showed a decrease with the exception of gadwall and canvasback. The former were still in migration at the time of the census in North Dakota so this increase is probably not an actual gain in breeding population. Canvasback should have been through migrating at the time of the census. The main decrease was caused by the lack of mallards and pintails which was explained previously in the paragraph regarding water conditions. The lack of ruddy ducks is assumed to be due to a delayed migration rather than an actual decrease (see brood counts).

The coot population on transects was 1,708 as compared to 1,798 in 1952, but here again the coot migration was retarded due to the snowstorm of May 11 and subsequent cold weather.

Success of the Season

Brood transects were run first on July 21-27 and gave the following results:

Table II. - Brood Count in North Dakota (86 Square Miles)

Species	Broods Per Square Mile			Percent Change from 1952
	1951	1952	1953	
B-w. teal	2.47	1.61	0.88	- 45
Pintail	1.21	0.90	0.46	- 49
Mallard	0.59	0.56	0.46	- 17
Ruddy duck	0.34	0.23	0.09	- 60
Gadwall	0.33	0.59	0.17	- 71
Shoveler	0.33	0.15	0.11	- 23
Redhead	0.26	0.17	0.16	- 7
Canvasback	0.23	0.21	0.32	+ 55
Lesser scaup	0.17	0.07	0.04	- 33
Baldpate	0.08	0.01	0.03	-
Unidentified	0.07	0.00	0.00	-
Total	6.08	4.50	2.77	- 39

On August 2, 1953 transect III A was re-run by Game Agents Jensen, Harms, and Meyerding and they found 53 broods where there had been only 37 on July 23. This represents an increase of 43 percent and if this percentage held up on all other transects then 37:53::238 (total broods seen on July census): x or X = 341. This is equal to 3.97 broods per square mile or only 12 percent less than in 1952 which compares favorably to the loss of 9 percent in breeding pairs. The second census of transect III A yielded over twice as many blue-winged teal broods and more broods of pintail and gadwall. We believe it safe to say that the 1953 hatch was not too far below that of 1952 by probably not more than 15 percent. The increase in canvasback broods was apparently due to a very successful breeding season for this species, the same as occurred in Saskatchewan.

In general we might conclude by saying that we lost some breeding pairs and broods on our transects in North Dakota but the loss was not a serious one. Lack of water in April may well have been the cause of the decrease in breeding population of mallard and pintails.

SOUTH DAKOTA

Breeding Population Trends

The breeding pair transects in South Dakota yielded the following results:

Table III. - Breeding Pairs in South Dakota (88 Square Miles)

Species	Pairs Per Square Mile			Percent Change	Species Composition		
	1951	1952	1953	from 1952	1951	1952	1953
B-w. teal	9.49	9.81	10.33	+ 5	39.0	36.1	41.3
Pintail	5.57	7.41	5.25	- 29	22.9	27.3	20.9
Mallard	3.32	3.81	3.74	- 2	13.6	14.0	14.9
Gadwall	2.59	2.57	2.17	- 15	10.6	9.4	8.6
Shoveler	1.61	1.70	1.43	- 21	6.6	6.6	5.8
Redhead	0.72	0.85	0.97	+ 13	2.9	3.1	3.8
Baldpate	0.35	0.18	0.19	- 6	1.4	0.6	0.7
Lesser scaup	0.20	0.32	0.51	+ 61	0.8	1.2	2.1
Ruddy duck	0.28	0.14	0.07	- 50	1.2	0.5	0.3
Canvasback	0.11	0.10	0.22	+111	0.5	0.4	0.9
All Others	0.07	0.19	0.18	- 5	tr.	0.5	0.7
Total	24.36	27.08	25.06	- 8	100	100	100

The South Dakota transects were run during a period of bad weather including the snowstorm of May 11. This may have affected the results to some extent.

Most of the diving ducks showed an increase on the transects in question with the exception of the ruddy duck which in all probability was delayed enroute to the breeding grounds due to inclement weather. The blue-winged teal which makes up about 40 percent of the breeding population seemed to hold its own in 1953 and in fact gained a little.

On the 1953 ground transects the Waubay Hills area was down 16 percent in breeding pairs while the Leola Hills were up 15 percent. Transects running through the James River Valley and adjacent areas were also down 17 percent.

Number of water areas showed an increase over 1952 although water levels were down at the time of the breeding pair census. Subsequent spring and summer rains more than made up for winter drought.

Table IV. - Number of Water Areas in May - South Dakota Transects

Area	1952	1953
Waubay Hills	522	558
James River Valley	286	276
Leola Hills	283	320
Total	1,091	1,154

Many of the water areas in 1953 were quite temporary in nature so that the gain in number of areas in 1953 was not a permanent one.

The coot population on transects was 972 as compared to 1,197 in 1952 but again this decrease may have been due to a retarded migration rather than an actual loss in breeding population.

Success of the Season

Brood counts were run on 66 square miles of transects on July 27 and 28, and a follow-up on August 12 and 13. Ordinarily July 27 and 28 would have been late enough but in 1953 apparently a considerable proportion of the hatch occurred after August 1 for such species as gadwall, blue-winged teal, and ruddy duck. The following table shows the results of the 1953 brood census compared to 1951 and 1952.

Table V. - Brood Census in South Dakota (66 Square Miles)

Species	Broods per Square Mile			Percent Change for 1952
	1951	1952	1953	
Blue-winged teal	2.29	2.73	2.42	- 11
Pintail	0.51	0.74	0.45	- 39
Gadwall	0.53	1.06	0.59	- 44
Mallard	0.27	0.54	0.59	- 8
Redhead	0.23	0.33	0.24	- 27
Shoveler	0.15	0.24	0.21	- 12
Ruddy duck	0.14	0.50	0.61	- 21
Lesser scaup	0.11	0.29	0.09	- 68
Canvasback	0.09	0.05	0.08	+ 67
Baldpate	0.03	0.03	0.03	0
Green-winged teal	-	0.01	-	-
Unidentified	0	0	0.08	- 71
Total	4.43	6.79	5.39	- 21

Although a 21 percent decrease in broods is indicated in Table V, the number of broods per square mile is still considerably over the 1951 figure but somewhat under the brood population for the Waubay area in 1949 on a per square mile basis.

Canvasback made a substantial gain as did the ruddy duck. In the case of the latter species it indicated that all of the breeding pairs had not migrated this far north at the time of the breeding pair census. The mallard apparently had a good nesting season and production was up slightly although breeding pairs were about the same as a year ago.

Although no record is kept of coot broods due to the difficulty in identifying a brood, nevertheless it was obvious that the coot population was definitely high and probably close to a "peak" for this area.

Summary of Data for North and South Dakota

The following table shows the relative abundance of waterfowl in the Dakotas for the 6-year period 1948 through 1953.

Table VI. - Relative Abundance of Ducks in the Dakotas for the 6-Year Period (Breeding Pairs per Square Mile on 225 Square Miles of Ground Transects)

Species	1948	1949	1950	1951	1952	1953
Blue-winged teal	7.7	8.8	12.6	9.3	9.5	9.2
Pintail	4.9	6.0	9.4	6.5	7.2	5.2
Mallard	3.1	4.7	5.4	3.8	4.5	3.9
Gadwall	2.3	2.8	2.9	2.4	2.5	2.6
Shoveler	2.0	1.9	2.9	2.1	1.7	1.4
Redhead	0.8	0.9	1.0	0.9	1.0	1.0
Ruddy duck	0.7	0.8	1.0	0.6	0.6	0.1
Canvasback	0.3	0.4	0.7	0.6	0.5	0.6
Lesser scaup	0.2	0.3	0.2	0.5	0.7	0.6
All Others	0.3	0.6	0.8	0.4	0.5	0.5
Total	22.3	27.2	36.9	27.1	28.8	25.1
Water Areas per Square Mile	9.7	8.1	12.8	11.3	12.6	12.6

The average of 25.1 pairs per square mile is about 2 pairs below "par" for the transects involved, par being about 27 pairs per square mile.

Pintail, mallard and ruddy duck showed the only significant decreases in 1953 and as said before this was not a true decrease for the ruddy but was caused by a late migration which occurred after the breeding pair census was made. The abundance of ruddy broods in South Dakota confirmed this fact.

Brood averages for the period 1949 through 1953 are summarized as follows:

Table VII. - Brood Averages - Class III only (North and South Dakota)

Species	1949	1950	1951	1952	1953
Blue-winged teal	7.54	7.37	7.74	7.56	8.11
Pintail	5.69	5.93	5.73	6.67	6.73
Gadwall	7.40	8.29	7.75	6.80	8.67
Mallard	6.67	6.25	7.24	6.62	6.52
Shoveler	6.54	7.31	7.37	5.50	6.62
Ruddy duck	6.50	5.00	-	4.80	*
Redhead	6.25	-	7.33	7.00	6.00
Lesser scaup	-	7.00	-	6.18	*

* Too few broods to give accurate averages.

Brood counts were made between July 20 and August 13. Most brood averages seemed to be higher in 1953. If these brood averages are statistically significant then the larger size of broods in 1953 may make up for the lesser number of total broods produced.

Summary

In general it may suffice to say that based on the limited data upon which this report is based that the 1953 waterfowl production in the Dakotas was only slightly less than in 1952 and not much if any below the average for the past six years. Production of pintails is definitely below that of 1952 and mallards may be down somewhat. We believe that the decrease in both species was caused by a lack of water at the time of spring migration rather than a shortage of breeding stock.

After a comparatively dry spring, there was abundant rainfall throughout the months of May, June and July. This precipitation maintained pothole levels throughout the brooding season in most of the important breeding areas in the Dakotas.

WATERFOWL BREEDING GROUND SURVEY IN NEBRASKA - 1953

Harvey W. Miller

Introduction

The Nebraska Breeding Ground Survey has been conducted for 6 consecutive years. The purpose of this survey is to provide indicators to the waterfowl population through measurement of the seasonal and yearly trends in breeding numbers and production success. The survey work for 1953 was restricted to the sandhill region with all data presented being gathered by the writer.

Method of Sampling and Area Covered

Aerial surveys were discontinued on all routes. Ground surveys were made on only the eastern and western sandhill routes using the same methods as have been used in the earlier surveys.

Weather and Water Conditions

The weather for the entire breeding season has been very unusual. An early warm period brought a large influx of waterfowl by early April with indications of an advanced season. By mid-April however, adverse weather set in and remained through most of the breeding season. A very severe freeze occurred on May 11.

The dry conditions of the western sandhills in late winter and early spring caused most of the potholes and other temporary water areas to dry up before the breeding season was well under way. In the central and eastern areas, however, normal spring rains maintained a normal to excellent number of water areas. The brooding period saw the spread of the near-drought conditions of the west to the eastern areas which resulted in the dry-up of all the more temporary areas by mid-July.

The large permanent type lakes throughout the sandhills, their levels being maintained by an excellent ground water table, showed very good to maximum levels during the entire season.

These conditions resulted in early nesting with an apparent high ratio of destroyed nests, especially in the early nesting species. Small, late broods in these same species indicated that some of the loss was taken up by re-nesting. The only effect on the later nesting species such as the blue-winged teal appears to have been a delay in activity.

Breeding Population Trends

Table I shows the results of the breeding population counts using the one-fourth mile transect method. Data for the western count is taken from approximately 125 miles of transect, that for the eastern count from approximately 32 miles of transect.

Table I. - Breeding Ground Survey

Routes and Dates	Computed Pairs *	Pairs per Square Mile	Total Ducks	Ducks per Square Mile	Lone Males 100 pairs Ratio
Mid-May Counts					
Western - 1952	851	25.4	1,629	49.2	67:100
Western - 1953	677	22.3	1,704	56.1	22:100
Eastern - 1952	160	14.3	270	34.2	41:100
Eastern - 1953	183	23.2	347	43.9	36:100
Over-all - 1952	1,011	24.6	1,905	46.4	62:100
Over-all - 1953	860	22.5	2,051	53.5	28:100
Percent Change		- 8.5		+15.3	
Mid-June Counts					
Western - 1948		12.8		35.8	
- 1949		20.0		32.8	
- 1950		13.9		29.2	
- 1951		21.2		34.4	
- 1952	557	20.3	851	33.0	181:100
- 1953	348	12.1	532	18.5	122:100
Percent Change **		-11.0		-43.9	
Eastern - 1952	112	13.7	152	18.5	203:100
- 1953	81	10.3	103	12.9	285:100
Percent Change		-24.9		-30.3	
Over-all - 1952	669	17.6	1,053	27.7	185:100
- 1953	429	11.7	635	17.3	141:100
Percent Change		-38.1		-42.5	

* Assuming lone males to be territorial and to represent a pair.

** Western route change based on average of five prior years, all other changes from 1952 only.

The purpose of two counts as listed in Table I is an attempt at sampling the late breeding blue-winged teal as well as the early nesting mallards and pintails. It is believed that the mid-June counts more nearly sample the sandhill breeding population than do the mid-May counts. The blue-winged teal represented 49 percent of the breeding pairs; the mallard, 22 percent; and the shoveler, redhead and pintail next 8 percent, 6 percent and 6 percent in that order.

Success of the Season

The average brood size for the prior five years of brood surveys has been from 7.0 to 7.1 ducklings for all age classes as compared to 6.2 ducklings for all age classes in 1953.

Table II. - Sandhill Brood Counts, Mid-July

	Western Route	Eastern Route	Over-all Routes
Number of Broods Observed	42	18	60
Total Ducklings Observed	243	127	370
Ducklings Per Brood			6.2
Square Miles Sampled	29.6	8.2	37.8
Broods Per Square Mile			
1948	1.2	1.2	1.3
1949	4.2	2.7	3.4
1950	1.6	2.2	1.8
1951	2.3	2.0	2.2
1952	2.5	8.6	3.8
1953	1.4	2.2	1.6
Percent Change from 1952	- 44	- 74	- 59
Percent Change from Average	- 42	- 33	- 36

Summary

It is evident that, subject to the survey limitations, a significant decrease occurred in the sandhill breeding population and production for 1953. The sample is too small to show any significant change in the species composition; observations indicated that the loss was general for all species. The main cause of this loss appears to have been the unusual adverse weather conditions during the nesting season which either discouraged nesting activity or destroyed established nests.

Banding Results

Table III. - Banding Results with Sex Ratios, August, 1953

Species	Local Male	Adult Male	Local Female	Adult Female	Total Bands	Local Male: 100 L. Fem.
Mallard	20	1	14	7	42	143:100
Gadwall	8	1	5	1	15	160:100
Pintail	7	3	5	1	16	140:100
Blue-winged teal	466	25	423	63	977	110:100
Green-winged teal	6	-	-	1	7	
Shoveler	1	1	2	-	4	
Redhead	4	-	-	-	4	
Canvasback	1	-	-	-	1	
Coot	-	-	-	-	1	
Total					1,038	

WATERFOWL BREEDING GROUND SURVEY IN MINNESOTA

Forrest B. Lee, et al*

Spring Migration, Weather, and Water Conditions

The month of March was mild, especially after March 9 when above freezing temperatures were commonly recorded over most of the State. Mallards were reported in southern Minnesota on March 15 and by March 24 numerous reports had been received of migrating waterfowl and other birds. April was considerably cooler and wetter than usual, and the spring migration seemed to be slowed down somewhat after its early start. The peak of the migration in central Minnesota was about April 15. A reconnaissance of southcentral counties was made on April 29, and pairs and small groups of blue-winged teal were common on the potholes.

The period of May 1 to May 8 was sunny and warm and was followed by general rains from May 9 to May 13. These rains were quite heavy and over an inch of precipitation was measured at weather bureau stations distributed over most sections of the State. In the northwest corner of the State there was less rainfall comparatively, however, the temperatures were low enough to freeze-over the potholes on several nights. These rains account in part for the large increase in the number of water areas tallied on the auto transects.

Heavy rains fell from May 19 to May 21. These rains were quite general but the northeast one-third of the State was hit hardest. The rain came down in cloudburst proportions and water was over the highways in some areas. Following are examples of weather bureau stations reporting over an inch of rainfall in a day: Detroit Lakes, 2.01 inches; Little Falls, 1.22 inches; Cloquet, 2.05 inches; Cambridge, 3.20 inches; Waseca, 1.28 inches.

Heavy rains fell in the northeastern part of the State on May 28 and 29 and a daily rainfall of over two inches was measured at several stations.

On June 7 and 8 a torrential downpour of up to six inches fell in several southern Minnesota counties, flooding much farmland. Tornadic winds accompanied the storm and buildings were blown down in some areas. This rainfall was fairly general over the State, totaling more than an inch at several other points including the Twin Cities, Fergus Falls, and Albert Lea.

* Migration, breeding population, and brood data summarized in this report were gathered by area game biologists of the Minnesota Division of Game and Fish: Area I, Milton H. Stenlund; Area II, Vernon E. Gunvalson; Area III, Lester T. Magnus, Roseau; Area IV, Robert E. Farmes; Thief River Falls; Area V, Norman J. Ordal, Fergus Falls; Area VI, John L. Zorichak, Brainerd; Area VII, Walter H. Petraborg, Aitkin; Area VIII, Forrest B. Lee, St. Paul; Area IX, Robert I. Benson, Glenwood; Area X, Gerald T. Bue, Marshall; Area XI, Donald H. Ledin, Fairmont; and Area XII, William H. Longley, Kasson. Clare L. Johnson and members of his duck lake survey crew gave valuable assistance in brood counts.

Western and central counties got heavy downpours on June 15 and 16 when general rains fell in the State. Heavy rains totaling 5 to 6 inches fell in much of west Otter Tail and Becker Counties and also parts of Wilkin and Grant Counties. These counties contain excellent duck breeding habitat. On June 19 and 20 heavy downpours occurred in the northeastern one-third of the State. Daily measurements of from one to two inches of rain were recorded at many towns; 4.15 inches fell at Moose Lake.

The prairie pothole region of western and central Minnesota received heavy rains on June 24 and 25. Over an inch was recorded at several towns. This rain was general and precipitation was recorded over the entire northern part of the State.

The final heavy rain of June came on the 27th and hit the counties afflicted by the cloudburst of June 7 and 8. At Worthington, 3.30 inches fell on June 8 and on June 27 another 2.10 inches was recorded.

The preceding information relative to rainfall during May and June can be summarized as follows:

1. Water levels were moderately low over much of the State during early May. Levels were very low in northwestern Minnesota where drought conditions prevailed during 1951 and 1952.

2. Water levels were raised during May and June in most parts of the State by heavy periodic rains. Total precipitations for these two months was greater than usual for much of the State including the principal waterfowl breeding range.

3. Much of the rain fell in heavy downpours creating temporary field ponds and raising the levels of ponds and streams.

Breeding Population Trends

The breeding pair survey was conducted from May 7 to 22. Comparable auto transects in 48 counties showed an increase of approximately 30 percent in the number of breeding pairs on the areas censused. These transects were run in Game Management Areas II, III, IV, V, VIII, IX, X, XI, and XII, which include the principal waterfowl breeding range in the State. The 1952 and 1953 auto transect routes were nearly identical. Minor detours accounted for a slight mileage difference. The auto transect data are as follows:

	1951	1952	1953
Counties:	51	48	48
Total Miles:	1,945	1,853	1,891
Total Water Areas:	1,693	1,451	2,150
Areas Occupied:	340	429	549
Water Areas Per Square Mile:	3.5	3.1	4.6
Percent Occupied:	20.1	29.6	25.5
Total pairs:	603	876	1,141
Pairs Per Square Mile:	1.24	1.89	2.41
Total Ducks:	1,219	1,590	2,885
Ducks Per Square Mile:	2.51	3.43	6.11
Coots	145	539	535

The increase was largely in the number of blue-winged teal. This year 56 percent more pairs of blue-winged teal were recorded than in 1952 (Table I). This year 52.9 percent of the breeding pairs recorded along the transects were blue-winged teal compared with 44.1 percent in 1952. The number of mallard pairs increased by 18 percent over 1952; and pintail pairs increased by 31 percent. A 23 percent decrease was noted in the number of ringneck duck pairs. Redhead pairs decreased by 9 percent. Increases in the number of pairs were noted in Areas V, VIII, IX, X, and XII. Decreases or little change were noted in Areas II, III, IV, VI, VII, and XI. Ringneck pairs appeared to be somewhat down in numbers over their entire range in the State.

Lesser scaup are migrants in Minnesota except for the few pairs that nest in the northwest corner of the State. This year many of these ducks lingered late into May and account in part for the large number of total ducks tallied on the transect routes. The increase in total ducks recorded on auto transects was over 80 percent more than last year. Lesser scaup and all other duck species are recorded on the aerial transects(Table 2) and the increase in total ducks over 1952 was 71 percent.

Success of the Season

Brood counts were made on 36 water and pothole transect areas. These censuses were all made in 1952 so a direct comparison was possible. The dates were from June 29 to July 10 both years. Most individual areas or routes were censused at approximately the same time during the census period each year. These brood count areas are distributed in all parts of the State.

Fewer broods than in 1952 were seen on 25 of the 36 areas. The same number was recorded on 7 areas and more broods were seen on 4 areas.

This year 136 broods were seen compared with 256 broods in 1952. This was a decrease of 46.9 percent. Many more paired adults were seen on the census areas this year; 232 compared with 72 last spring. Fewer broods were seen of all species except goldeneye. There were 17 goldeneye broods recorded compared with 10 broods last year. The following tabulation shows age class distribution and average size of broods for 1952 and 1953:

Table I. - Species Data from Auto Transects (Lone Males are Counted as Pairs)

Species	Number of Pairs			Percent Composition			Percent Change from 1952
	1951	1952	1953	1951	1952	1953	
Blue-winged teal	277	386	603	45.9	44.1	52.9	56
Mallard	135	173	204	22.4	19.8	17.9	18
Ringneck	74	133	102	12.3	15.2	8.9	- 23
Redhead	14	43	39	2.3	4.9	3.4	- 9
Pintail	44	48	63	7.3	5.5	5.5	31
Shoveler	18	19	33	3.0	2.2	2.9	--
Baldpate	5	12	25	0.8	1.4	2.2	--
Gadwall	4	5	7	0.7	0.6	0.6	--
Ruddy duck	17	10	7	2.8	1.1	0.6	--
Canvasback	--	1	7	--	0.1	0.6	--
A. goldeneye	3	9	5	0.5	1.0	0.4	--
Wood duck	2	2	5	0.3	0.2	0.4	--
Green-winged teal	2	4	3	0.3	0.5	0.3	--
Black duck	1	--	--	0.2	--	--	--
Merganser	--	--	1	--	--	0.1	--
Bufflehead	--	--	3	--	--	0.3	--
Lesser scaup	5	28	26	0.8	3.2	2.3	--
Unidentified	2	3	8	0.3	0.3	0.7	--
Total	603	876	1,141	99.9	100.1	100.0	

Table II. - Aerial Transect Data

Transect Number and Segments	All Waterfowl Tallied			Percent Change From 1952
	1951	1952	1953	
3 (1-5)	22	8	3	- 5
5 (1-5)	19	13	23	10
9 (1-5)	64	40	68	28
11 (1-5)	62	52	43	- 9
13 (1-4)	56	46	60	14
15 (1-4)	24	57	73	16
19 (1-8)	76	182	163	- 19
21 (1-11)	301	219	440	221
23 (1-11)	196	204	301	97
25 (1-11)	117	111	142	31
27 (1-12)	192	158	317	159
29 (1-8)	41	36	68	32
30 (1-8)	52	29	109	80
31 (1-14)	118	58	214	156
32 (1-14)	68	125	263	138
	1,408	1,338	2,287	949

		Class I	Class II	Class III
1952				
	No. broods:	86	117	53
	Percent:	33.6	45.7	20.7
	Average Size:	7.31	7.76	6.64
1953				
	No. broods:	84	44	8
	Percent:	61.8	32.4	5.9
	Average Size:	7.34	7.20	6.16

This year 61.8 percent of the broods observed were of the Class I or downy size compared with 33.6 percent for this Class last year. Last year more older broods were present: 45.7 percent were Class II and 20.7 percent were Class III. This year 5.9 percent were of the larger Class III size. Average brood sizes are similar for the 2 years.

In view of the larger portion of broods in Class I as compared with 1952, it appeared that the brood counts this year were made earlier phenologically. After these brood counts which were comparable with 1952 counts had been summarized in mid-July, it appeared that waterfowl nesting had suffered losses and delays due to the adverse weather conditions of May and June.

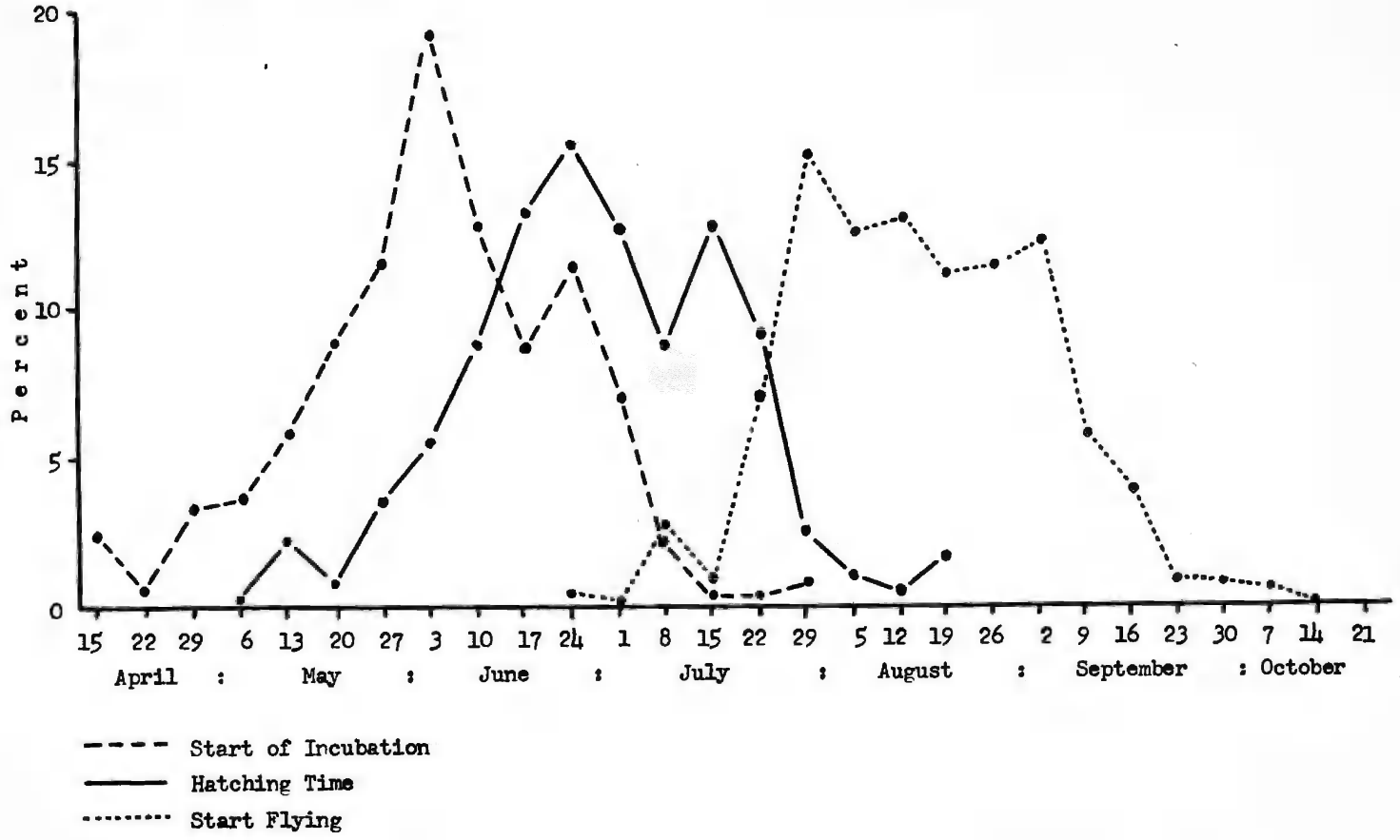
The extent of renesting or late nesting could not be known until later when additional brood counts were made.

Three brood counts were completed during June, July, and August on 27 water areas and pothole transect routes. Broods were aged according to the 7 classes discussed by Blankenship et al in Techniques for Brood Production Studies. Data from each water area or transect route were handled individually by species. Broods from the second count were eliminated from the usable data if they would have hatched within 6 days of the time when first-count broods of the species were estimated to have hatched.

The following example illustrates the procedure used: Two broods of teal from the first count on a slough were estimated to have hatched on June 27. On the second count 5 broods of teal were counted which were estimated to have hatched between June 18 and July 2. Two of the 5 broods would not be used since it is possible that they had been recorded on the first count. This procedure was also used in handling the data of the third counts.

A total of 354 broods was usable from the counts on the 27 water areas and transect routes after the previously described process of elimination had been carried out. Data on the probable age of broods in each plumage class were not available for all species; the exceptions being ringneck, ruddy duck, goldeneye and wood duck. The probable ages listed for lesser scaup were assigned to these broods and to aged but unidentified broods. The ages for lesser scaup were used since the flight age of this species is intermediate between that of the extremes (blue-winged teal, 40 days; canvasback and redhead, 60 days). A small number of the broods were aged only as Class I, Class II, or Class III. These broods were apportioned as equally as possible to the various sub-classes. The 354 usable broods were distributed as follows by species:

Graph 1. - Time of Hatching, Start of Incubation, and Start of Flying as Determined by 354 Aged Duck Broods


20
15
10
5
0
Percent
15 22 29 6 13 20 27 3 10 17 24 1 8 15 22 29 5 12 19 26 2 9 16 23 30 7 14 21
April : May : June : July : August : September : October
Start of Incubation
Hatching Time
Start Flying

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Blue-winged teal	115	Baldpate	5
Mallard	82	Canvasback	4
Ringneck	38	Wood duck	4
Ruddy duck	37	Gadwall	1
Redhead	32	Lesser scaup	1
Goldeneye	14	Unidentified	11
Pintail	10	Total	354

The percent composition which could be calculated from this species distribution of broods does not necessarily reflect the composition of the breeding waterfowl population of the State. The beat-out method was not used and it is likely that the less wary species were recorded more often than those that lead their broods into heavy cover. However, blue-winged teal, mallard, and ringneck, in this order, were the most prominent species in the breeding pair census as well as in the brood count. These three species made up 80 percent of the breeding pairs and 66 percent of the broods.

The principal objective in conducting the three brood counts was to secure data which would enable the plotting of curves to show (1) dates of nest establishment, (2) dates of hatching and (3) the dates when young ducks are first able to fly. The brood information is plotted in this manner in Graph 1.

Each brood was dated back to the probable day of hatching. Then the beginning of incubation was determined by subtracting from the hatching date the number of days in the normal incubation period of the species. The flight age was determined by adding to the hatching date the number of days it takes young of the species to mature sufficiently for flight.

An examination of Graph 1 shows that some incubation had begun during the week of April 12 - 18. This was mostly mallard and pintail. The greatest number of ducks had started incubating during the period from May 31 to June 6. A drop is shown for the week of June 14 - 20. This is the period when heavy downpours occurred in some of the better waterfowl breeding areas of the State. A second peak in incubation occurred during the week of June 21 - 27.

Corresponding peaks are noted for the periods of hatching. The greatest hatch, as indicated by the data, occurred during the week of June 21 - 27. The second peak is shown for the week of July 12 - 18.

The period when the greatest number of the broods would start flying was July 26 to August 1. Considerable numbers were getting on the wing through the period of August 30 to September 5. Of the 354 broods, 44 or 12.6 percent, would not be able to fly until after September 6. One late brood of blue-winged teal was noted which would not be able to fly until the period of September 20 - 26. Most of the other very late broods were redheads and ringnecks. A note of interest is that two very late nesting records for these species were recorded in 1950 and 1951. On September 15, 1950, Gerald Bue found a redhead nest at Heron Lake, Jackson County. Robert Farmes saw a flightless Class III b ringneck at Twin Lakes, Kittson County, on October 10, 1951.

Summary

1. An excellent breeding waterfowl population was found on the May breeding pair inventory. Auto transect data showed an increase over 1952 of approximately 30 percent in the number of breeding pairs. This spring 56 percent more pairs of blue-winged teal were seen than in 1952.

2. Weather conditions during May and June were generally poor for waterfowl nesting. Heavy rains caused water levels to rise considerably in many parts of the State. The rains were often of a cloudburst nature with heavy downpours in short periods of time.

3. Brood counts were conducted on 36 water and pothole transect areas from June 29 to July 10. These areas were all censused during this same period in 1952. Fewer broods were seen on 25 of the 36 areas. On all 36 areas, 136 broods were seen compared with 256 broods in 1952. Many more paired adults were seen this year.

4. In an attempt to evaluate the entire breeding season, three brood counts were made during June, July, and August on 27 water areas and pothole transect routes. A total of 354 broods was aged according to the method discussed by Blankenship et al in TECHNIQUES FOR BROOD PRODUCTION STUDIES. A curve of hatching dates was prepared to possibly provide an index to waterfowl production. Since the method of aging is relatively new and was tried for the first time this year, it is difficult to interpret the data with certainty. However, some speculation lends to the matter.

5. Sixty-four percent of the 354 broods recorded on three-count areas were judged to have hatched on or before July 4, and the highest peak of the hatch came in the period of June 21 - 27. Thus, the main hatch occurred during or previous to the general brood counts of June 29 to July 10 which showed fewer broods than in 1952. A second smaller peak was shown for the week of July 12 - 18. These data indicate that 1953 waterfowl production was down considerably, due to adverse weather and breeding conditions in May and June.

WISCONSIN WATERFOWL BREEDING GROUND AND PRODUCTION SURVEYS, 1953

Laurence R. Jahn

Introduction

Purpose and History of Survey

In 1949 and 1950 Wisconsin employed extensive ground and aerial transects to find out the densities of breeding waterfowl in the State. It was learned that, with only a few exceptions, densities of breeding waterfowl were low when compared to the prime breeding range farther north. Therefore, in 1951, a simple spot-type sampling system was initiated to follow the trends in our State waterfowl breeding population. This system has been employed each year since 1951.

Organization and General Course of Work

The 20 district game managers of the five administrative areas of the State game division again conducted the field work for the waterfowl surveys. Advisory assistance was given this group of men by personnel of the Pittman-Robertson waterfowl research (6-R) and game survey (25-R) projects.

Methods and Descriptions

Methods Used in Sampling

For a detailed discussion of the methods used to follow trends in the State waterfowl production picture in 1951 and 1952, see U. S. Fish and Wildlife Service Special Scientific Report: Wildlife No. 12 (1951), or Wisconsin Wildlife Research X: 3:10-24 (1951). The system used in those two years was modified slightly this year. The highlights of the sampling system and the modifications are described here.

1. Each game manager, except in districts 10 and 17, was asked to census at least 15 water areas in his district by ground. Each district was requested to cover at least 75 percent of the same water sites censused in 1952. It was suggested that the game managers drop a few undesirable census areas, but not more than 25 percent of the total sites per district. No aerial work was carried out.

   (a) The water sites were censused once during the breeding ground survey from May 10-30 during regular working hours. The same water areas were covered once during the production survey from June 29-July 10, between 4:00 and 8:00 a.m. The hour and one-half immediately preceding sunset was also used for running production surveys in a few cases. In 1951 and 1952 two production surveys were conducted.

   (b) The 20 game districts in the State were again divided into three groups. Each group had different calendar dates for conducting the waterfowl surveys to correct for widely varying phenological differences.

2. Managers were urged to census water sites ranging in size from one-fourth to 10 acres. In districts where such areas were scarce, lakes and flowages were covered. A few rivers and streams were censused in the northern part of the State.

3. Water areas were classified as to size and type of the first coverage (Table I). The size of a site is the estimated number of censused acres, including the zone of emergent vegetation. The water area classification included:

A - Permanent, less than 10 acres in size.
B - Semi-permanent (dependable except in dry years).
C - Temporary (dry by late summer except in wet years).
F - Flowage.
L - Lake (any permanent body of water, not streamlike, which is 10 acres or larger in size).
S - Stream.

4. To follow water conditions experienced during these surveys, the water levels found during the production survey were compared with the water levels found during the breeding-ground survey using the following terms.

NC - No change	L - Less water
M - More water	D - Completely dry

5. Data on waterfowl species were recorded in the usual way.

Distribution of Water Areas

Figure 1 shows the State-wide distribution of the 282 water sites censused during these surveys. Table I gives the number of different types of water areas and the total acres censused.

Data Collected With a Brief Discussion of Its Meaning

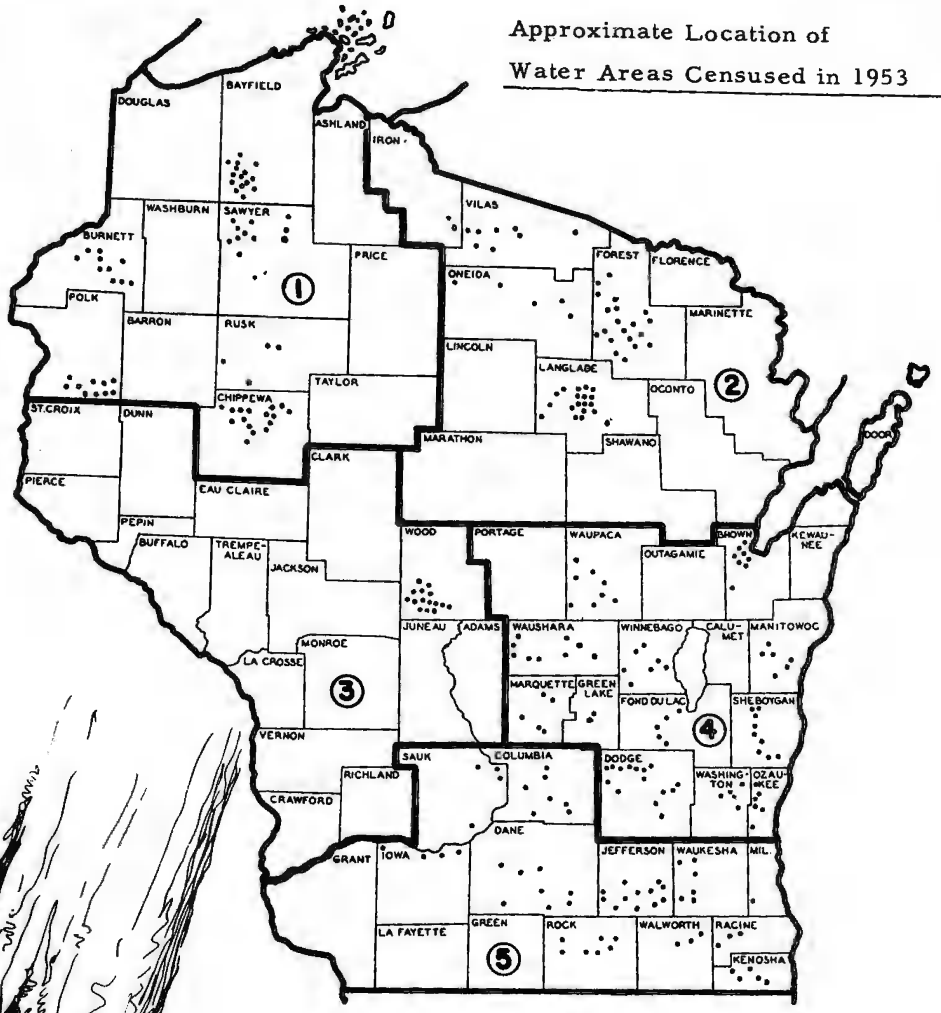
Weather and Water Conditions

During the first 3 months of 1953, both the precipitation and the temperature were above normal. Spring migrant waterfowl moved into Wisconsin rather early and found plenty of temporary feeding and loafing areas. April was wetter and colder than normal, causing migrant waterfowl to linger in the State until the last 5 to 10 days of the month. The mid-summer weather during the last 10 days of April allowed farmers to get in the fields. The weather bureau estimated that 70 percent of the spring grains had been sown by May 1. The same percent was estimated to be planted by May 1 in 1952.

Waterfowl nesting started about the same time as in 1952, both years being considered early.

FIGURE 1.

Approximate Location of
Water Areas Censused in 1953



Each dot represents one water site checked.
Heavy lines are game area boundaries.
Circled numbers are game area numbers.

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Table I. - 1953 Wisconsin Waterfowl Breeding Surveys

Water Area Classification

No. of Water Areas - Occupied by Ducks and Coots

Game Mgt. Area	Game Mgt. Dist.	No. Cover-age	A	No. Occ.	B	No. Occ.	C	No. Occ.	F	No. Occ.	L	No. Occ.	R or S	No. Occ.	Total No. Areas	Tot. No. Occ.	Acreage A	Acreage B	Acreage C	Acreage of F	Areas L	Areas R or S	Areas Tot.
I	1	1st.	4	2	4	1	1	1	0	0	11	7	0	0	20	11	31	23	3	0	269	0	326
	2	1st.	7	0	11	3	1	0	3	0	5	2	0	0	27	5	34	43	1	110	92	0	280
	3	1st.	7	3	4	1	2	0	0	0	7	2	0	0	20	6	36	10	1	0	107	0	154
Tot.			18	5	19	5	4	1	3	0	23	11	0	0	67	22	101	76	5	110	468	0	760
II	4	1st.	3	0	0	0	0	0	4	3	2	2	6	5	15	10	17	0	0	250	105	216	588
	5	1st.	12	6	4	0	0	0	2	2	2	2	0	0	20	10	29	4	0	35	50	0	118
	6	1st.	8	4	5	2	0	0	3	0	3	2	0	0	19	8	27	6	0	20	50	0	103
Tot.			23	10	9	2	0	0	9	5	7	6	6	5	54	28	73	10	0	305	205	216	809
III	7	1st.	NO COVERAGE																				
	8	1st.	NO COVERAGE																				
	9	1st.	10	10	2	2	0	0	0	0	3	3	0	0	15	15	46	5	0	0	35	0	86
Tot.			10	10	2	2	0	0	0	0	3	3	0	0	15	15	46	5	0	0	35	0	86
IV	11	1st.	2	1	7	3	0	0	1	1	6	5	0	0	16	10	14	12	0	40	210	0	276
	12	1st.	0	0	0	0	0	0	4	4	11	5	0	0	15	9	0	0	0	140	350	0	490
	13	1st.	4	1	1	1	0	0	0	0	10	9	0	0	15	11	17	1	0	0	395	0	413
	14	1st.	9	7	7	6	1	1	0	0	3	2	0	0	20	16	29	15	5	0	95	0	144
	15	1st.	16	7	4	2	0	0	0	0	0	0	0	0	20	9	38	5	0	0	0	0	43
Tot.			31	16	19	12	1	1	5	5	30	21	0	0	86	55	98	33	5	180	1050	0	1366
V	16	1st.	2	2	8	6	2	2	0	0	3	3	0	0	15	13	8	41	8	0	79	0	136
	18	1st.	7	4	4	4	4	2	0	0	0	0	0	0	15	10	34	12	5	0	0	0	51
	19	1st.	11	10	1	1	0	0	0	0	3	3	0	0	15	14	29	1	0	0	54	0	84
	20	1st.	8	6	1	1	5	3	1	0	0	0	0	0	15	10	38	1	22	7	0	0	68
Tot.			28	22	14	12	11	7	1	0	6	6	0	0	60	47	109	55	35	7	133	0	339
GRAND TOTAL			110	63	63	33	16	9	18	10	69	47	6	5	282	167	427	179	45	602	1891	216	3360

Table II shows that of 282 water sites censused twice during these surveys, 72 percent showed no change or more water during the second coverage as compared to the first coverage. Late June and early July experienced below normal precipitation. However, plenty of water remained for waterfowl production.

Table II. - 1953 Wisconsin Waterfowl Breeding Surveys and Water Conditions

Game Area	No. Coverage	No. Change	More Water	Less Water	Completely Dry	Percent Showing more water or no change
I - NW	2nd	18	49	0	0	100
II - NE	2nd	41	11	2	0	96
III - WC	2nd	12	0	3	0	80
IV - EC	2nd	43	10	33	0	62
V - S	2nd	17	1	38	4	30
Total	2nd	131	71	76	4	72

Breeding Population Trends

Wisconsin has as its principal breeding ducks, the blue-winged teal, mallard, black duck, wood duck, and ringneck. All of these species demonstrated an increase in breeding pairs except the wood duck, with the blue-winged teal increasing its status over 1952 by 200 percent (Table III). Table V summarizes the breeding pair and production trends for the period 1951-1953.

Table III. - Wisconsin Waterfowl Breeding Pair Trends *

Species	Average Index 1951 to 1953	1952 Index	Percent lone ♂ 1952	1953 Index	Percent lone ♂ 1953	Percent change of 1953 Index from Average	Percent change of 1953 Index from 1952
Mallard	.03 prs./acre	.03	39	.05	59	+ 67	+ 67
B-w. teal	.05 " "	.03	25	.09	32	+ 80	+200
Black Duck	.004 " "	.004	--	.007	--	+ 75	+ 75
Wood Duck	.005 " "	.007	41	.006	45	+ 20	- 14
Ringneck	.008 " "	.01	39	.01	29	+ 25	n c
Total Ducks	.10 " "	.09	30	.18	38	+ 80	+100

	1951	1952	1953	Average
Adult Coot Observed per acre	.001	.015	.049	.020
Percent Change of 1953 from:	+480	+227	--	+ 145

* Total estimated pairs based on pairs, lone males, lone females, and unidentified duck pairs and single ducks observed. Index figures are based on the number of pairs per acre sampled.

Table IV. - Summary of 1953 Brood Data *

Species	Class I			Class II			Class III			Total		
	Number Broods	No. Young	Average	No. Broods	No. Young	Average	No. Broods	No. Young	Average	No. Broods	No. Young	Average
B-w. Teal	21	142	6.8	33	266	8.1	3	13	4.3	57	421	7.4
Mallard	8	74	9.3	32	204	6.4	22	145	6.6	62	423	6.8
Black duck	2	16	-	4	38	9.5	8	42	5.3	14	96	6.9
Wood duck	4	34	8.5	4	35	8.8	2	13	-	10	82	8.2
Baldpate	0	0	0	1	3	-	0	0	0	1	3	-
Total Dabblers	35	266	7.6	74	546	7.4	35	213	6.1	144	1,025	7.1
Ringneck	4	34	8.5	1	11	-	0	0	0	5	45	9.0
Hooded Merganser	0	0	0	8	46	5.8	5	31	6.2	13	77	5.9
Canvasback	0	0	0	1	1	-	0	0	0	1	1	-
Total Divers	4	34	8.5	10	58	5.8	5	31	6.2	19	123	6.5
All Ducks	39	300	7.7	84	604	7.2	40	244	6.1	163	1,148	7.0

* Figures based on complete brood counts of the second coverage only.

Results of Breeding Ground and Production Surveys

In 1951, 55 percent of the water sites sampled were occupied by some duck species or coots during the breeding ground survey. In 1952, 57 percent was occupied, while this year 59 percent was occupied.

A greater percent of flocked female ducks was observed this year as compared to last year, indicating that some of the birds did not breed successfully. (Table V). This can no doubt be related to the cold wet weather of early April when the birds were starting their breeding activities.

Phenologically, the 1953 duck hatch was similar to that of 1952. The peak of the duck hatch occurred prior to July 10 this year, and also last year.

Data on the average brood size of each species are summarized in Table IV. Table V shows that the average 1953 brood size of 7.0 is 6 percent greater than the 6.6 obtained in 1952.

Confirmed records of free-flying Canada geese breeding in Wisconsin were centered about areas where the birds have been found nesting successfully in previous years. Goslings were produced at the Suamico Game Sanctuary and the Bay Beach Wildlife Refuge (both in Brown County), the Horicon Marsh, Beaver Dam Lake, and near Lowell (all in Dodge County), the Brodhead Public Hunting Ground (Green County), the Central Wisconsin Conservation Area (Jackson County), the Necedah National Wildlife Refuge, the Sprague-Mather Refuge, the Wisconsin River, and the Central Wisconsin Conservation Area (all in Juneau County), the Manitowoc River (Manitowoc County), and the Wood County Public Hunting Grounds (Wood County). Reports were also received indicating the presence of adult Canada geese after June 1 in Dane, Fond du Lac, Green Lake, Marquette, Oconto, Oneida, Walworth and Winnebago Counties. It is doubtful if any of these birds nested successfully.

Table V. - Comparison of Wisconsin Waterfowl Breeding Survey Figures, 1951-1953

	1951	1952	1953
Pairs Per Acre	.078	.092	.180
Indicated Change (Percent)	-	+ 18	+ 96
Percent Female of Total Flocked Birds	16	19	27
Young per Breeding Pair	1.46	2.58	2.35
Indicated Change (Percent)	-	+ 77	- 9
Average Brood Size	6.5	6.6	7.0
Indicated Change (Percent)	-	+ 2	+ 6

Summary

The spring waterfowl migration arrived in Wisconsin rather early and departed during the last 10 days of April. An abundance of temporary water areas in the spring was due to the above normal precipitation experienced during the first 4 months of 1953.

A cold wet April apparently discouraged some ducks from nesting successfully, because the percent of females observed in flocks was greater than in 1951 and 1952.

The waterfowl breeding phenology was similar to that of 1952, both years being considered early. Most duck broods were observed between June 25 and July 10.

Based on the fact that the estimated breeding pairs showed a 96 percent increase over 1952, that the number of young produced per breeding pair changed only slightly from the number produced in 1952, and that the average brood size showed a 6 percent increase over 1952, it is concluded that the waterfowl production trend in Wisconsin was upward this year, as compared to 1951 and 1952.

Summary of Summer Waterfowl Banding Operations

No trapping and banding of wild ducks was carried out between June 15 and September 15. Hand-reared mallards, and wild and artificially propagated Canada geese were banded and released. A breakdown of the birds handled is presented below.

Species	Adult Male	Adult Female	Immature Male	Immature Female	Total
Mallard (Hand-reared)	83	257	1,153	916	2,409
Canada Geese (Wild)	0	5	0	0	5
Canada Geese (Propagated)	0	0	46	28	74

WATERFOWL BREEDING GROUND SURVEY IN INDIANA, 1953

James D. McCall

This is the 5th consecutive year that Indiana has cooperated with the U. S. Fish and Wildlife Service in conducting a waterfowl breeding ground survey.

The State has been arbitrarily divided into 3 zones -- southern, central and northern, and river transects were studied in each zone (Map 1). A light weight boat and a 5 h.p. outboard motor were used again this year for floating the rivers.

A number of potholes were studied again this year for trend data on both breeding populations and brood production. These areas are located in northern Indiana and were censused by a 2-man crew wading and beating out possible hiding cover.

Several potholes have been studied this year for the first time and do not yield comparative information. Therefore, only the comparable data for the river transects and study areas are included in this report. In addition, a limited amount of aerial brood censusing was conducted in LaGrange and Steuben Counties. Useful data gathered during this flight will be treated separately in the text.

The study leader was assisted on the river floats by Conservation Officers and Pittman-Robertson personnel.

Weather and Water Conditions

February was unusually mild and dry, and although a variety of weather was experienced during March, it was predominately warm and slightly above normal in precipitation. April averaged cold, windy, and below normal in precipitation. Weather data for periods later than April are not as yet available, but conditions have been and are dry. Approximately 50 percent of the 14 pothole study areas were dry by the end of May. The aerial survey on June 30 surveying 56 square miles in Noble, LaGrange, and Steuben Counties revealed that of the 162 potholes which normally should hold water through June - 112 or 69 percent were dry.

Breeding Population Trends

Censusing of breeding pairs was conducted between April 20 and May 30, 1953. Seven river transects, involving 105 miles, indicated a 2 percent increase in the wood duck. Fifteen pothole study areas in 11 northern Indiana counties were comparable with 1952, and showed a 73 percent decrease in the mallard and 22 percent increase in the blue-winged teal.

The mallard is the only one of the 3 species that correlates with the 1953 brood survey. It should be remembered that the small sample represented by the mallard and blue-winged teal breeding ranges tends to magnify the percentage change from year to year.

The blue-winged teal migration was late this year, but it was impossible to tell to what degree this late migration affected the validity of the breeding populations survey until the brood census was completed. This explains one of the reasons why we are inclined to rely almost entirely upon the results of the brood survey.

WATERFOWL BREEDING GROUND SURVEY

INDIANA - 1953

■ - Jasper - Pulaski State Game Preserve

~ - River Transects run in 1952-1953

• - Study Areas Checked in 1952-1953

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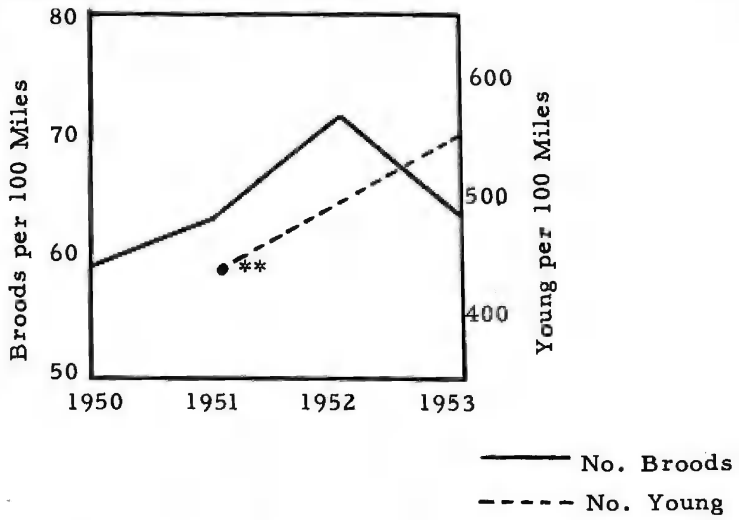
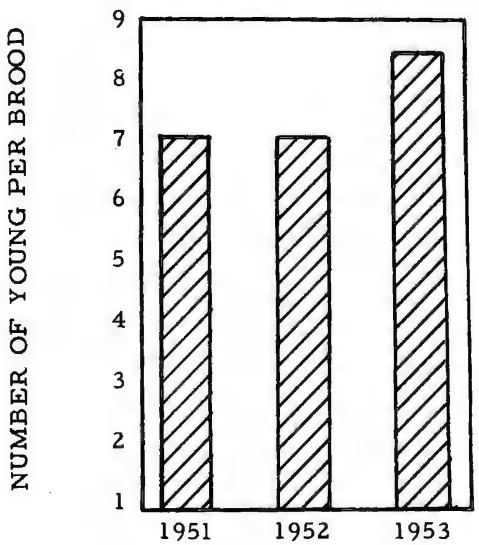
Figure I. - Wood Duck Broods and Young Per 100 Miles of Comparable River Transect*, Indiana - 1950 through 1953



* Total milage used in computing this graph amounted to 103 miles for 1950 - 1951, 106 miles for 1951 - 1952, and 143 miles for 1952 - 1953.

** No data on average number of young per whole brood for 1950.

Figure II. - Average Number of Young Wood Duck per Brood* by Years Indiana, 1951 - 1953



* Only whole counts are used in computing the average number of young per brood.

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Success of the Season

Comparative brood data were gathered from June 1 to 30 inclusive. As compared with 1952, the number of broods decreased 11 percent for the wood duck, 46 percent for the mallard, and remained the same for the blue-winged teal (see Table 1). The sample of mallard and blue-winged teal breeding habitat was extremely small and their trends should not be elaborated upon. Over 95 percent of our wood duck are reared on the streams of the State, and the sample of 143 linear miles of river transects are considered reliable and representative of wood duck trends in Indiana.

It is of importance to note that, although the number of wood duck broods shows an 11 percent decrease, the number of young per brood increased by 1.7 birds per brood and resulted in an increase of 12 percent in the total number of young produced. The 104 wood duck broods averaged 7.1 young per brood for a total of 738 young in 1952; while the same transects produced only 93 wood duck broods this year, but averaged 8.8 young per brood for a total of 818 ducklings. The average number of young per brood increased for the mallard and black duck by 2.1 and 1.7 respectively, while the blue-winged teal decreased by 1.0 young per brood (see Table II).

There has been some discussion as to the status of the wood duck following the heavy kill experienced during the hunting season last year. Therefore, it might be well to go back further than 1952 in determining its present status. Using 1950 as the first year with comparable data in Indiana, 59.2 broods were observed per 100 miles of river transects. The number of wood duck broods increased in 1951 and again in 1952, but decreased in 1953. Meanwhile, the average number of young per brood was 7.1 for 1951 and 1952 but increased to 8.8 in 1953 (Figure 1.). In short, the number produced this year is above the average for the 3 preceding years (Figure 2).

In considering all species encountered, the 143 miles of river transects averaged 0.75 broods per linear mile in 1952 and 0.66 broods in 1953. The 14 pothole study areas, representing 15 square miles, produced an average of 1.13 broods per square mile in 1952 and 0.83 broods in 1953. Most of the broods seen on the river transects were wood duck. Exceptions include 1 mallard brood, 1 black duck brood, and 2 hooded merganser broods in 1952; and 2 black duck broods, and 2 hooded merganser broods in 1953.

Water levels and coverage of the Jasper-Pulaski State Game Preserve was comparable with that of 1951. Weather conditions prevented the completion of the survey in 1952. Nineteen Canada geese nests were located in 1951 while only 10 were observed this year.

Aerial Brood Survey - 1953 Only

The aerial brood census of June 30 was the first attempt to increase the sample of pothole nesting habitat in northern Indiana by this technique. The aerial brood survey covered 42 square miles of potholes and 8 miles of the Pigeon River. It was confined to LaGrange and Steuben Counties, and involved 1 hour and 50 minutes of early morning low level flying.

Table I. - Production Trends on 143 Linear Miles of River Transects and 14 Pothole Study Areas -- Indiana

Species	No. Broods by Age Class 1952 I	1952 II	1952 III	1953 I	1953 II	1953 III	Total Broods 1952	Total Broods 1953	Percent Change
Mallard	3	8	2	-	3	3	13	6	- 46
Black Duck	1	-	1	-	-	3	2	3	--
B-w. Teal	1	1	-	2	-	-	2	2	Same
Wood Duck	57	39	8	33	49	11	104	93	- 11
Lesser Scaup	-	1	-	-	-	-	1	-	--
Ringneck	-	-	-	-	-	1	-	1	--
H. Merganser	-	2	-	-	1	1	2	2	--
Coot	-	-	-	1	-	-	-	1	--
Fla. Gallinule	-	-	-	1	-	-	-	1	--
Total	62	51	11	37	53	19	124	109	- 12

Table II. - Comparison of Number of Young Per Brood*, by Species and Age Class, All Observations -- Indiana, 1952-1953

Species	Average No. Young Per Brood 1952 I	1952 II	1952 III	1953 I	1953 II	1953 III	No. Broods in Sample 1952	No. Broods in Sample 1953	Total Average 1952	Total Average 1953
Mallard	8.2	6.4	5.3	12.5	8.7	8.3	19	22	6.7	8.8
Black Duck	-	6.0	7.0	-	-	8.5	5	2	6.8	8.5
B-w. Teal	10.0	11.0	7.0	7.3	8.2	-	7	8	8.9	7.9
Wood Duck	7.6	6.4	6.6	9.5	8.5	6.3	114	77	7.1	8.8
Ringneck	-	-	-	-	-	13.0	-	1	-	13.0
H. Merganser	-	11.0	-	-	-	5.0	2	1	11.0	5.0
Fla. Gallinule	-	-	-	4.0	-	-	-	1	-	4.0
Canada Geese	4.7	5.0	-	-	-	-	7	-	4.7	-
Total							154	112	7.1	8.7

* Only whole counts are used in computing average number of young per brood and these figures are not to be compared with brood production data in Table I.

Of the 142 potholes observed, which should normally retain water through June, 100 or 70 percent were dry. The remaining 42 potholes containing water supported 25 broods, or 0.59 broods per square mile. Sixty percent of the 25 broods encountered were mallard, 24 percent blue-winged teal, 12 percent wood duck, and 4 percent were black duck.

Summary

Only comparative data are included in this report with the exception of the aerial survey which is dealt with separately in the text.

Approximately 50 percent of the potholes in northern Indiana were dry by May 30, and 70 percent by June 30. During 1951 and 1952 the water level remained at normal high through June.

The breeding population survey failed to correlate satisfactorily this year and further discussion is not necessary since it is not considered as reliable as the brood survey in Indiana.

The number of wood duck broods observed on 143 miles of river transects dropped from 104 in 1952 to 93 in 1953, but the average number of young increased by 1.7 per brood and resulted in a 12 percent increase in the total number of young reared to an average age of about 3 weeks.

The number of mallard broods dropped 46 percent but the average number of young increased 2.1 per brood. The drop in broods was probably due to drought conditions.

The number of blue-winged teal broods remained the same, while the number of young dropped 1.0 young per brood.

In considering all species observed, the 143 miles of river transects averaged 0.75 broods per linear mile in 1952 and 0.66 broods in 1953. The 14 pothole study areas, representing 15 square miles averaged 1.13 broods per square mile in 1952 and 0.83 broods in 1953. These transects and check areas in Indiana have been laid out to yield maximum trend data and the number of broods per given area should not be applied to the State as a whole.

Trapping and banding was not initiated until September.

WATERFOWL BREEDING GROUND SURVEY IN NEW YORK, 1953

Dirck Benson, Donald D. Foley and Donald Schierbaum

Introduction

The third consecutive aerial waterfowl production survey based upon a sampling plan devised by the Fish and Wildlife Service was completed during July 6 to 10, 1953. As in 1951 and 1952, when the work was more a pilot study, the same system and methods were used, although the coverages of certain strata this year were modified at the suggestion of the Waterfowl Biometrician. The flying has been done consistently by John A. Schempp and Ed Maunton. Figure I shows the location of transects and cluster problem areas covered by air, and also the 4 rivers sampled by canoe by Benson and Foley for comparative purposes.

As additional measurements of the waterfowl populations, 1,471 birds were banded during the period June 15 to September 15, 1953 with Schierbaum correlating this phase of the work. Both drive-trapping and bait trapping were done, the former on an experimental scale in the western part of the State with the help of Oliver H. Hewitt and students of Cornell University. Bait trapping locations included Lake Alice, Kings Bay, Perch Lake, Oak Orchard, Montezuma Refuge (operated by the Fish and Wildlife Service), Tomhannock Reservoir and Basic Creek Reservoir.

The breeding ground survey of sample areas by ground observers, begun in 1949, was coordinated by the waterfowl project this year and considerably broadened and standardized. It is covered in another section of this report.

Methods of Sampling and Area Covered

The aerial survey methods consisted of two types. One was the straight-line transects over the largest or most important phytogeographic stratum of the State. The boundaries of these strata in 1951 and 1952 were taken from Braun's classification, but for 1953 were modified toward better agreement with forest and soil types and with waterfowl productivity. Figure 2 indicates the stratum as used for 1953.

Transects were laid out as parallel strips 1/8-mile wide approximately at right angles to the drainage, of a sufficient sample mileage in each stratum to give an error as a waterfowl index of not greater than plus or minus 30 percent. Due to the extremely sparse populations found on the Adirondack transects the first 2 years, transects were omitted from this stratum in 1953. Likewise, the 2 smallest strata (Champlain and New England) were disregarded.

The cluster problem areas of each stratum included large rivers, lakes, swamps, and marshes which differed markedly from their surrounding habitat, and which presented special problems. Sufficient sampling of areas over 500 acres in size in each stratum was accomplished so that the resultant error should not have exceeded plus or minus 30 percent for marshes and swamps and 20 percent for rivers, while for lakes the minimum shoreline mileage recommended by the Waterfowl Biometrician was used. A strip 1/4-mile wide was covered over the marshes and swamps and converted into square miles for the production index, while for rivers and lakes a linear mileage basis was used.

FIGURE 1. Areas Covered for Aerial Production Indices - July 6-10, 1953

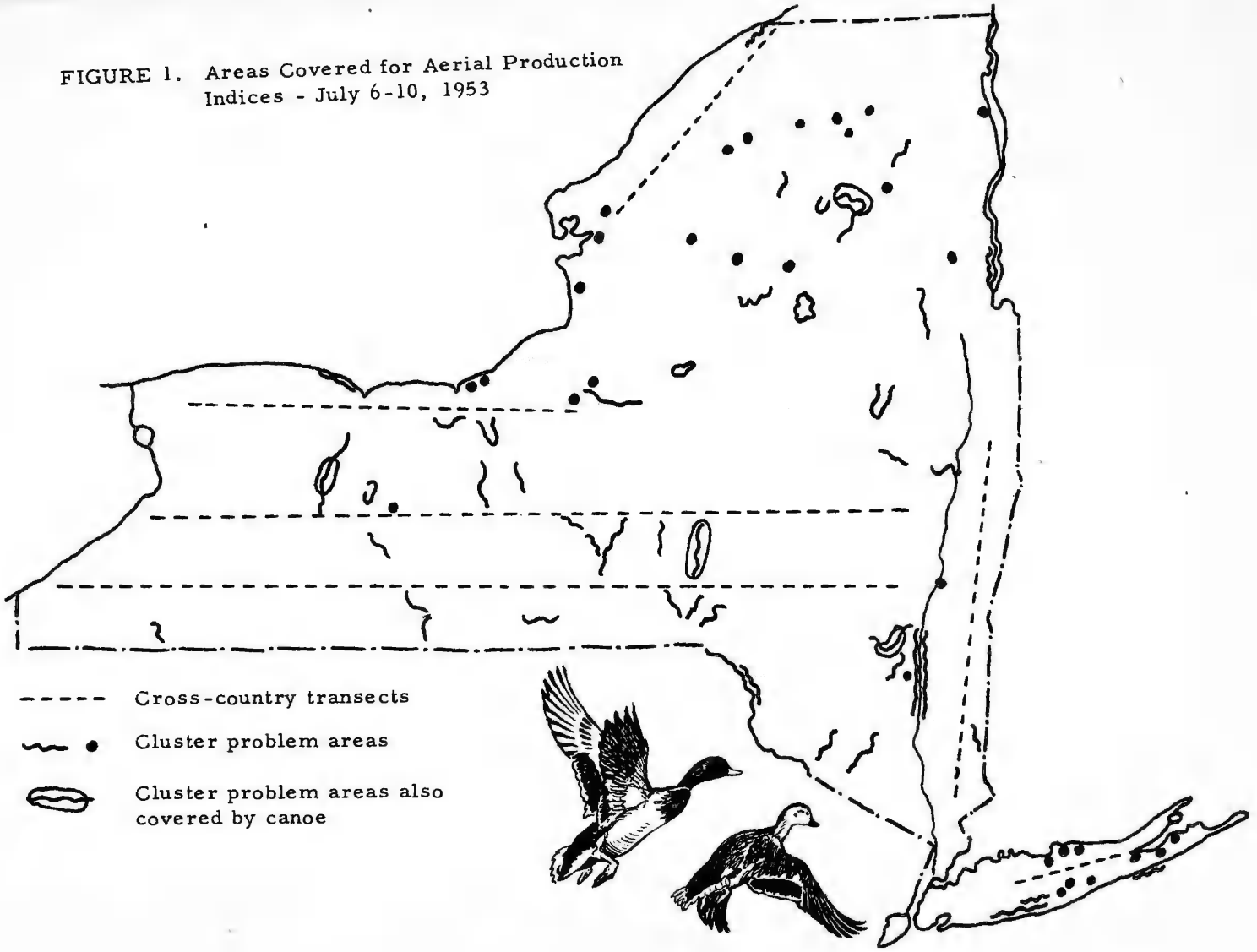

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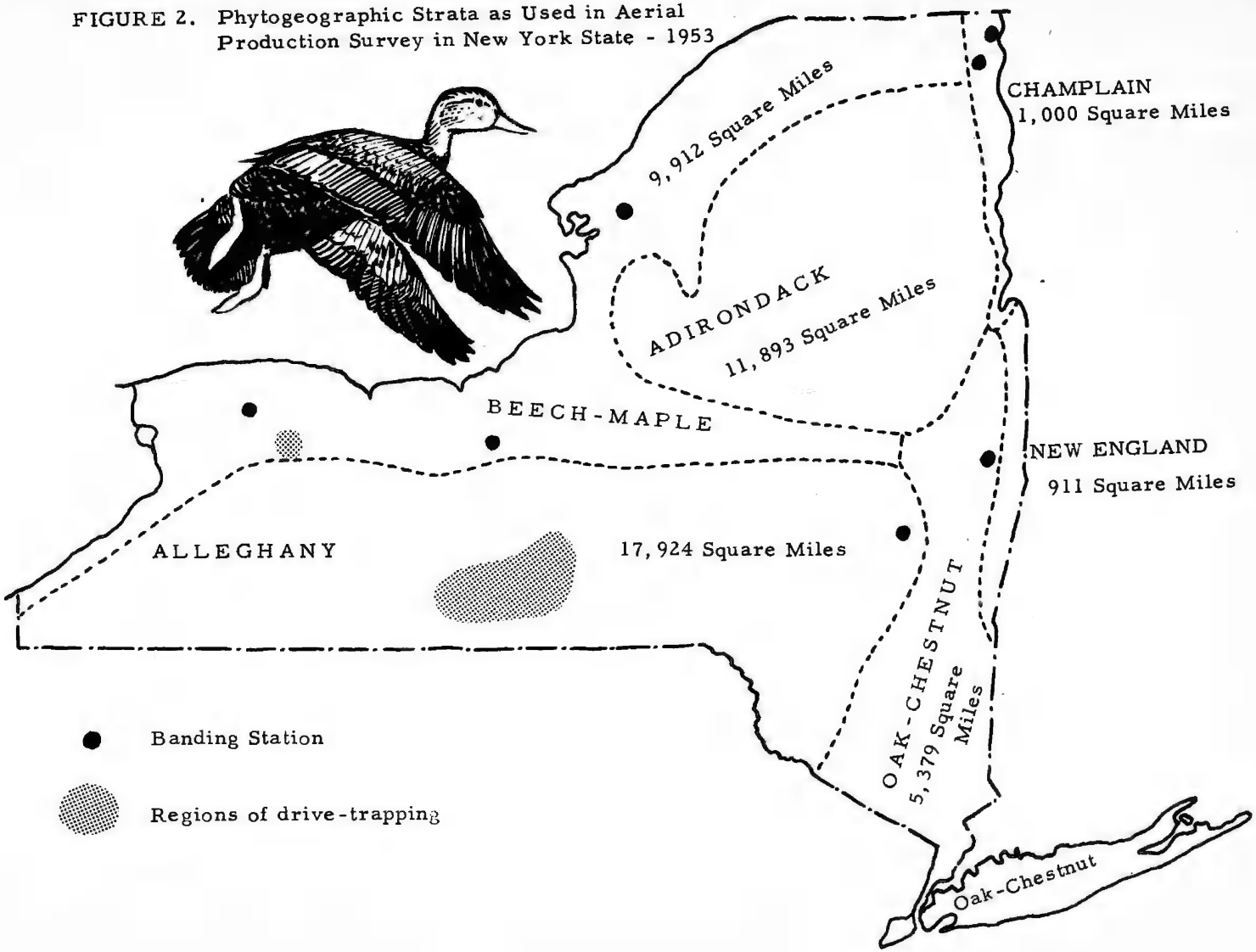
FIGURE 2. Phytogeographic Strata as Used in Aerial Production Survey in New York State - 1953



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The figures indicating waterfowl abundance are thought to be more nearly representative this year since both more accurate strata boundaries were delineated and a better distribution of strata types and random sampling thereof were made. If, however, with continued minor improvements and changes each year, the wide variations in the indicated abundance cannot be reduced, then the method must either be greatly altered or abandoned.

Weather and Water Conditions

During March, April and May the weather over the State was generally milder and wetter than normal, which probably resulted in a somewhat earlier nesting season. Most of June and July were very dry with rainfall considerably less than normal. However, few water areas suffered serious reduction in water level until late July, at which time many large early broods were already on the wing. Observations indicated that the success of re-nestings, although probably not numerous, was not as good as the earlier hatches.

Breeding Population Trends

As shown in Tables I to V, there apparently were increases in waterfowl abundance in the Beech-Maple and Oak-Chestnut strata (with the exception of the coastal marshes), and decreases in the Alleghany and Adirondack strata. However, the decreases noted in the latter are thought to be more apparent than real for several reasons. The Alleghany transects are among the most questionable of the flight-lines, covering as little waterfowl habitat as they do to apply to such a large region. In this stratum it will be noted that the production for the rivers was the best of the 3 years. As for the Adirondacks, it should be understood that the comparatively high production indices for swamps and marshes in 1951 and 1952 were accounted for largely by the then-included areas of Beech-Maple stratum. The normally-expected lower figures for the Adirondacks have been in all probability more closely realized this year.

Neither the Laurentian or Champlain strata show any comparable production for the 3 years, since the Laurentian has now been considered part of the Beech-Maple, and the Champlain was split off from the Adirondacks only this year.

Table I. - Aerial Census of Waterfowl Production - Adirondack Stratum

Type	Year	Size in Sq. Mi. *	Size in Linear Miles**	(1) Size of Sample Sq. Mi.	(2) Size of Sample L. Mi.	Ducks Observed in Sample Broods	Ducks Observed in Sample Pairs	Ducks Observed / sq. or L. Mi. Broods	Ducks Observed / sq. or L. Mi. Pairs	Production Index Broods	Production Index Pairs
Transect	1951	15,893	-	81.4	-	4	4	0.05	0.05	795	795
	1952 (3)	15,893	-	81.4	-	2	1	0.02	0.01	318	159
	1953	11,893	-	(no transect sampling----------)							
Lakes	1951	-	1,133	-	128	2	0	0.02	0	23	0
	1952 (3)	-	1,133	-	128	1	0	0.01	0	11	0
	1953	-	1,195	0	128	9	4	0.07	0.03	84	36
Rivers	1951	-	450	-	62	2	2	0.03	0.03	14	14
	1952 (3)	-	450	-	62	1	0	0.02	0	9	0
	1953	-	235	-	60.5	8	5	0.13	0.08	31	19
Swamps	1951	23.6	-	2.9	-	11	0	3.79	0	89	0
	1952 (3)	23.6	-	2.9	-	3	2	1.03	0.69	24	16
	1953	35.0	-	2.9	-	1	2	0.34	0.69	12	24
Marshes	1951	24.2	-	5.3	-	18	4	3.40	0.75	82	18
	1952 (3)	24.2	-	5.3	-	3	4	0.57	0.75	14	18
	1953	22.0	-	2.1	-	1	1	0.48	0.48	11	11

* Includes only transects, swamps and marshes.

** Includes only shoreline of all major lakes and rivers.

(1) Includes only random samples of transect area, swamps and marshes to give ± 30 percent error.

(2) Includes only random samples of shoreline of major lakes and river to give ± 20 percent error for rivers; recommended minimum for lakes.

(3) Figures for the July 2 to 14 flights only; also flown in 1952 on July 22-28.

Table II. - Aerial Census of Waterfowl Production - Alleghany Stratum

Type	Year	Size in Sq. Mi. *	Size in Linear Miles **	Size of Sample Sq. Mi. (1)	Size of Sample L. Mi. (2)	Ducks Observed in Sample		Ducks Observed / sq. or L. mile		Production Index	
						Broods	Pairs	Broods	Pairs	Broods	Pairs
Transect	1951	18,924	-	67.9	-	7	4	0.10	0.06	1,892	1,135
	1952 (3)	18,924	-	67.9	-	1	2	0.01	0.03	189	568
	1953	17,924	-	67.9	-	1	7	0.014	0.10	251	1,792
Lakes	1951	-	498	-	39	1	0	0.03	0	15	0
	1952 (3)	-	498	-	39	2	1	0.05	0.03	25	15
	1953	-	473	-	39	0	2	0	0.05	0	25
Rivers	1951	-	664	-	131	8	1	0.06	0.01	40	7
	1952 (3)	-	664	-	131	2	3	0.02	0.02	13	13
	1953	-	664	-	147	9	3	0.06	0.02	40	13

* Includes only transects, swamps and marshes.

** Includes only shoreline of all major lakes and rivers.

(1) Includes only random samples of transect area, swamps and marshes to give ± 30 percent error.

(2) Includes only random samples of shoreline of major lakes and river to give ± 20 percent error for rivers; recommended minimum for lakes.

(3) Figures for the July 2 to 14 flights only; also flown in 1952 on July 22-28.

Table III. - Aerial Census of Waterfowl Production - Beech-Maple Stratum

Type	Year	Size in Sq. Mi. *	Size in Linear Miles **	Size of Sample Sq. Mi. (1)	Size of Sample L. Mi. (2)	Ducks Observed in sample		Ducks Observed / sq. or L. mile		Production Index	
						Broods	Pairs	Broods	Pairs	Brood	Pairs
Transect	1951	5,628	-	14.3	-	2	0	0.14	0	788	0
	1952 (3)	5,628	-	14.3	-	2	3	0.14	0.21	788	1,182
	1953	9,912	-	26.0	-	10	3	0.38	0.12	3,767	1,189
Lakes	1951	-	450	-	94	0	0	0	0	0	0
	1952 (3)	-	450	-	94	0	0	0	0	0	0
	1953	-	159	-	20	2	2	0.10	0.10	16	16
Rivers	1951	-	131	-	36	0	0	0	0	0	0
	1952 (3)	-	131	-	36	1	0	0.03	0.03	4	0
	1953	-	460	0	85	4	5	0.05	0.05	23	31
Swamps	1951	7.8	-	0.9	-	0	0	0	0	0	0
	1952 (3)	7.8	-	0.9	-	0	0	0	0	0	0
	1953	23.7	-	2.8	-	1	4	0.36	1.43	8	34
Marshes	1951	31.4	-	6.5	-	17	1	2.62	0.15	82	5
	1952 (3)	31.4	-	6.5	-	8	7	1.23	1.08	39	34
	1953	47.9	-	7.2	-	33	17	4.58	2.36	219	113

* Includes only transects, swamps and marshes.

** Includes only shoreline of all major lakes and rivers.

(1) Includes only random samples of transect area, swamps and marshes to give ± 30 percent error.

(2) Includes only random samples of shoreline of major lakes and river to give ± 20 percent error for rivers; recommended minimum for lakes.

(3) Figures for the July 2 to 14 flights only; also flown in 1952 on July 22-28.

Table IV. - Aerial Census of Waterfowl Production -- Oak-Chestnut Stratum

Type	Year	Size in Sq. Mi. *	Size in Linear Miles**	Size of Sample Sq. Mi. (1)	Size of Sample Linear Mi. (2)	Ducks Observed in sample		Ducks Observed / sq. or L. Mile		Production Index	
						Broods	Pairs	Broods	Pairs	Broods	Pairs
Transect	1951	5,379	-	22.0	-	0	0	0	0	0	0
	1952 (3)	5,379	-	22.0	-	6	0	0.27	0	1,452	0
	1953	5,379	-	23.0	-	11	5	0.48	0.22	2,582	1,183
Rivers	1951	-	408	-	138	4	2	0.03	0.015	12	6
	1952 (3)	-	408	-	138	2	1	0.015	0.01	6	4
	1953	-	408	-	147	4	5	0.03	0.034	12	14
Swamps	1951	1.4	-	0.2	-	1	0	5.00	0	7	0
	1952 (3)	1.4	-	0.2	-	1	0	5.00	0	7	0
	1953	6.0	-	0.4	-	0	3	0	7.50	0	45
Marshes	1951	6.4	-	1.4	-	5	0	3.57	0	23	0
	1952 (3)	6.4	-	1.4	-	0	1	0	0.71	0	5
	1953	7.7	-	1.3	-	1	1	0.77	0.77	6	6
Estuarial Marsh	1951	40.0	-	2.8	-	8	2	2.86	0.71	114	28
	1952 (3)	40.0	-	2.8	-	1	6	0.36	2.14	14	86
	1953	30.4	-	2.8	-	0	4	0	1.43	0	43
Ocean Marsh	1951	32.0	-	2.8	-	3	3	1.07	1.07	34	34
	1952 (3)	32.0	-	2.8	--	0	4	0	1.43	0	46
	1953	29.9	-	2.8	-	0	2	0	0.71	0	21

* Includes only transects, swamps and marshes.

** Includes only shoreline of all major lakes and rivers.

(1) Includes only random samples of transect area, swamps and marshes to give ± 30 percent error.

(2) Includes only random samples of shoreline of major lakes and rivers to give ± 20 percent error for rivers; recommended minimum for lakes.

(3) Figures for the July 2 to 14 flights only; also flown in 1952 on July 22-28.

Table V. - Aerial Census of Waterfowl Production - Laurentian and Champlain Strata

Type	Year	Size in Sq. Mi. *	Size in L. Mi. **	Size of Sample Sq. Mi. (1)	Size of Sample L. Mi. (2)	Ducks Observed in Sample		Ducks Observed / sq. or L. Mi.		Production Index	
						Broods	Pairs	Broods	Pairs	Broods	Pairs
LAURENTIAN STRATUM											
Rivers	1951	-	75.2	-	18.4	0	1	0	0.05	0	38
	1952 (3)	-	75.2		18.4	0	0	0	0	0	0
	1953	(no Laurential stratum)									
CHAMPLAIN STRATUM											
Marshes	1951	(no Champlain stratum)									
	1952	(" " ")									
	1953	2.8	-	0.6	-	0	6	0	10.00	0	28

* Includes only transects, swamps and marshes.

** Includes only shoreline of all major lakes and rivers.

(1) Includes only random samples of transect area, swamps and marshes to give ± 30 percent error.

(2) Includes only random samples of shoreline of major lakes and river to give ± 20 percent error for rivers; recommended minimum for lakes.

(3) Figures for the July 2 to 14 flights only; also flown in 1952 on July 22-28.

Table VI. - Waterfowl Production Indices for the Various Strata of New York State, 1951 to 1953 as Indicated by Aerial Transect

Strata	PRODUCTION INDEX Broods	Pairs
ADIRONDACK		
1951	1,003	827
1952*	376	193
1953	138	90
ALLEGHANY		
1951	1,947	1,142
1952*	227	596
1953	291	1,829
BEECH-MAPLE		
1951	870	5
1952*	831	1,216
1953	4,033	1,383
OAK-CHESTNUT		
1951	190	68
1952*	1,479	141
1953	2,600	1,312
LAURENTIAN		
1951	0	38
1952*	0	0
1953 (no Laurentian stratum this year)	----------	----------
CHAMPLAIN		
1951 (no Champlain stratum this year)	----------	----------
1952 (" " " " ")	----------	----------
1953	0	28

*Figures for the July 2 to 14 flight only; also flown in 1952 on July 22 to 28.

Broods and Brood Sizes

Although the data are probably too meager from which to draw any conclusions with certainty, the information concerning broods seen and the numbers of young noted in each is given here for completeness.

Table VII. - Numbers of Broods and Their Average Size

Strata	1951		1952		1953	
	No.	Av. Size	No.	Av. Size	No.	Av. Size
Adirondack						
Black Duck	29	6.5	4	4.0	11	5.1
Mallard	3	6.3	-	-	1	9.0
B-w. Teal	2	3.5	-	-	-	-
Wood Duck	1	9.0	2	3.5	1	4.0
Merganser	-	-	-	-	6	7.2
Unidentified	-	-	3	8.7	-	-
Alleghany						
Black Duck	1	6.0	4	5.3	9	5.3
Mallard	1	1.0	1	6.0	-	-
Wood Duck	-	-	-	-	1	6.0
Unidentified	14	5.4	-	-	-	-
Beech-Maple						
Black Duck	16	3.6	7	4.9	24	5.8
Mallard	-	-	-	-	13	5.4
Wood Duck	-	-	2	5.0	11	6.5
Coot	-	-	-	-	1	6.0
Unidentified	3	6.3	2	3.5	1	5.0
Oak-Chestnut						
Black Duck	14	5.1	5	6.0	9	5.1
Mallard	2	4.5	1	5.0	1	8.0
Wood Duck	-	-	2	10.0	5	4.6
Unidentified	4	1.3	-	-	-	-
Total	90	5.2	33	5.5	94	5.7

Possibly the only safe statement is that wood ducks have apparently made a good comeback from a low in 1951, probably caused by the loss of nest sites due to the severe storm of November 1950.

Success of the Season

It is believed that the number of duck broods hatched and reared successfully was substantially greater this year than in 1952, as is shown in Table VII. The number of young per brood was greater for black ducks and mallards in 1953 than for either 1951 or 1952, while for wood ducks the large increase in broods seen more than offset the apparent decrease in brood size.

Comparison of Canoe and Aerial Census on Rivers

Four of the rivers censused by the airplane were also covered by canoe at about the same time in 1953. Each of the rivers was located in a different stratum in an attempt to determine whether results by the two methods would be any more comparable under any one set of conditions than another. The data collected in the two ways are given in Table VIII.

Table VIII. - Data Obtained by Aerial and Canoe Coverage of the Same Four Rivers

Strata	Mileage Covered	Waterfowl Observed		Waterfowl Per Mile	
		Broods	Pairs	Broods	Pairs
ADIRONDACK					
Raquette River					
Aerial	29.0	4	3	0.14	0.10
Canoe	13.2	5	11	0.38	0.83
BEECH-MAPLE					
Genesee River					
Aerial	42.0	4	3	0.10	0.07
Canoe	10.0	0	0	-	-
ALLEGHANY					
Unadilla River					
Aerial	10.0	1	3	0.10	0.30
Canoe	10.0	7	7	0.70	0.70
OAK-CHESTNUT					
Esopus Creek					
Aerial	20.0	0	0	0	0
Canoe	10.2	0	0	0	0

It would appear that generally the waterfowl observations by canoe were more thorough, at least over the same stretches of river as run this year, since from 2 to 8 times as many birds were seen as by air. However, this in itself should not invalidate the aerial data provided a comparable index is obtained each year, especially since a much greater coverage can be made quicker and more cheaply by this method. Only a 10-mile mid-portion of the Genesee River was censused by canoe, which proved to be barren as compared to the rest of the stretch flown. The chief reason for differences in the two census methods was the over-hanging trees and brush which hid the birds from aerial observation.

Summary

The aerial transect and cluster problem breeding survey this year showed encouraging increases in waterfowl broods over 1951 and 1952 of 4.4 percent and 284.8 percent respectively. These, of course, are extremely variable indices, and surely the method used in obtaining them needs modification, but for the years in question it is believed that they do show trends.

The Adirondack stratum showed a fairly uniform low density of broods and pairs per square mile, and this was even more true of the Alleghany type. Oak-Chestnut sampling has given erratic and confusing data, even when to all appearances conditions should have been comparable. The Beech-Maple stratum has shown encouraging results when sampled adequately by this aerial method, and apparently there were definite population increases in this region of the State in 1953.

Summer Banding

Most of the 1,471 ducks banded during the summer of 1953 were taken in baited traps during August and September. In July, 42 were taken by driving small marshes constructed by the Department, and many of these were extremely young ducklings. Figure 2 shows the location of the banding stations and regions of drive-trapping, and Table IX gives the total birds banded by species, age and sex.

Table IX. - Waterfowl Banded in New York State During June 15 to September 15, 1953

Species	ADULT			IMMATURE			Total
	Male	Female	*Undet.	Male	Female	*Undet.	
Black Duck	36	33	-	224	215	51	559
Wood Duck	37	44	3	164	141	33	422
Mallard (wild)	17	36	29	129	158	3	372
Mallard (reared)	-	-	-	51	50	1	102
B-w. Teal	1	1	-	1	1	-	4
G-w. Teal	-	1	-	-	1	2	4
Pintail	-	2	1	3	2	-	8
Total	91	117	33	572	568	90	1,471

*Age and Sex Undetermined.

WATERFOWL BREEDING GROUND SURVEY IN NEW HAMPSHIRE

James A. Lee

Introduction

In order that it can be fully informed of the status of its waterfowl resources, the New Hampshire Fish and Game Department, through its Management and Research Division, has annually conducted a three phase population inventory. The waterfowl breeding ground survey forms an integral part of this inventory. It provides the Department with detailed information on breeding success; brood sizes and mortality; extension or shifting of ranges of various resident species and the use of the different habitat types by the nesting species. The status of its breeding population when combined with the fall inventory data, allows the establishment of open season dates which benefit ducks and hunters alike.

Methods of Sampling and Area Covered

The breeding ground survey this year marks the fifth year it has been carried out. The major share of the field work was conducted by the writer ably assisted by Mr. John Boyle, a graduate student. This work was carried on intensively through the months of May, June, July and August. The work in May consisted largely of detailed studies of the Wood Duck breeding population on key areas throughout the State.

A total of 108 areas was visited, including most of those surveyed in the preceding years. Conservation Officer Fred T. Scott covered the more important areas in the Pittsburg area (Northern Region) for the fourth straight year.

Methods used in the 1953 survey were identical to those of the previous years. Emphasis was placed on the location of broods rather than on breeding pairs or nests. Repeated checks of the same areas provided information on brood mortality in the various age classes. Each area as it is surveyed is covered in its entirety. Actual survey may be one of several methods or a combination. A number of the areas adjacent to the road can be covered from a car, with the aid of a window mounted scope. Oftentimes observation with binoculars from a high tree provides adequate coverage. A canoe is used only when the other methods are not feasible or after the other methods have been used and a further check is desired. As a canoe disturbs the ducks it is usually difficult to get a complete count of ducklings in a brood. All data are entered on mimeographed forms immediately after an area has been surveyed. Broods are tallied as being complete, incomplete, probable or possible, on the basis of the observations.

Representative habitat types are visited in each of the regions. It is known that the majority of waterfowl produced in New Hampshire come from the numerous small areas such as beaver ponds, oxbow ponds, marshy coves in lakes and ponds, meadow marshes, and major streams, where from one to several broods are raised. Large, extensive waterfowl producing areas are few and atypical, and do not constitute in themselves an accurate sample of breeding conditions throughout the State. Also, these better areas with their extensive cover introduce a higher percentage of error into the survey than those more easily inventoried.

Data Collected

In collecting and tabulating the data, a classification of the State by natural divisions has again been used. A map showing the divisions is included (See Map 1). The data consists largely of the number of broods and potential broods observed in each of the divisions. These figures are shown in Table I, and include totals for 1952 and 1953 for areas visited both years. Under broods are included the number of broods actually observed, whether complete or incomplete. Under potential broods are all probable broods as indicated by groups of immature ducks, and possible broods as indicated by actions of maternal females. The figures on potential broods are included simply because they may represent a better measurement of production than is indicated by the total of reasonably sure broods.

Weather and Water Conditions

The spring of 1953 was characterized by cold, rainy weather. Flood conditions prevailed in many sections during the early part of the nesting season. Heavy snowstorms in early May in the Northern region caught many ducks that were already nesting. Water levels stabilized in early June at a somewhat higher level than in 1952. July and August saw drought conditions grip the State and many small areas dried up. Aquatic and marsh vegetation was retarded in the early part of the nesting season and observation during this period was especially good.

Breeding Population Trends

Early in the survey it was anticipated that due to the degree of renesting having been carried out because of high water conditions, the clutches would average smaller than in 1952. This factor when combined with the natural mortality occurring in broods would materially reduce the average brood size for all age classes.

Examination of the figures in Table I reveal increases in all species on a State-wide basis with the exception of the Black Duck and Goldeneye. Here a 10 percent reduction in Black Ducks and a 1 percent reduction in Goldeneyes can be noted.

Wood ducks showed a marked increase of 43 percent over their 1952 production level, having reversed their downward trend of the past 2 years. The brood production of this species this year now compares favorably to the population estimates made prior to the decrease begun in 1951.

The sampling methods as carried on during the past 4 years have proved to be accurate enough to indicate what they were intended to show; namely, the approximate relative abundance of the different species and any production trends that might occur.

Using Tables I and II, a breakdown of the data pertinent to each species yields the following information:

1. Black Duck - A total of 88 broods in 1952; 80 in 1953.

The Black Duck has shown a slight reduction (10 percent) from last year's level. However, this may be the result of chance variation and as such this decrease is not considered too significant. A comparison of the average number of young per

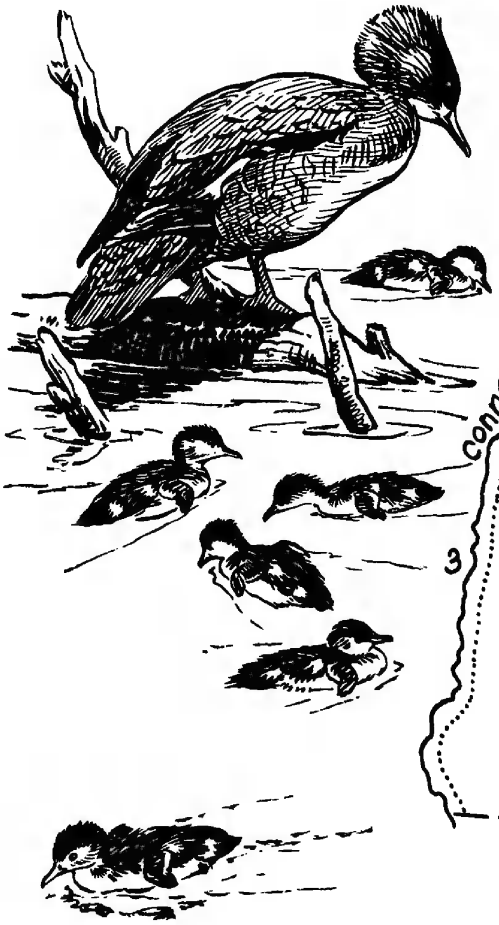
MAP 1.

WATERFOWL BREEDING GROUND SURVEY DIVISIONS

NEW HAMPSHIRE - 1953

LEGEND

1. Northern
2. White Mts.
3. Conn. Valley
4. Lakes
5. Southwest
6. Southeast
7. Coastal



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brood in Table II shows a considerable reduction. Thus, while the total brood production varied slightly, the number of immature blacks available for the gun decreased.

2. Wood Duck - A total of 93 broods in 1952; 133 in 1953.

The wood duck, as explained previously, has made a strong comeback this year, with its total brood production up 43 percent. While the average number of young per brood decreased, this reduction was not as great as in the case of the black duck. While many nesting boxes were partially submerged, clutches from renests did not serve to lower the average brood size as markedly as in the black duck.

3. Ring-necked Duck - A total of 8 broods in 1952; 16 in 1953.

As New Hampshire's newest addition to her nesting species, the ring-necked duck has shown a very marked increase in brood production. While no new nesting sites were uncovered, the number of broods on previously used areas nearly doubled in all instances. Average brood size was lower in 1953, however, tending to offset somewhat the effects of an increased brood production. Due to its late nesting habits, figures for age Class III broods are few and do not accurately reflect the availability of immatures for hunting.

4. Goldeneye - A total of 13 broods in 1952; 11 in 1953.

The goldeneye reveals a very slight decrease (1.0 percent) in brood production. Average brood size increased as high water levels provided optimum conditions for rearing of young birds on the larger northern lakes. The over-all picture of the goldeneye in northern New Hampshire has shown a slight but steady drop in production during the past 3 years. The occupation of the goldeneye's breeding sites by the ring-necked duck has aroused some speculation in the writer's mind as to the former's future. While there is no evidence to show that the goldeneye is not tolerant of the ring-necked duck, it may well be that a gradual shifting northward of the goldeneye's southern breeding limit is taking place.

5. Hooded Merganser - A total of 21 broods in 1952; 26 in 1953.

The Hooded merganser still remains New Hampshire's third most common nesting duck. While brood production of this species increased in 1953, the average brood size figures parallel those of the wood duck in showing a decrease. The Northern region still remains the stronghold for this species, although a substantial number are to be found in the State's lakes region.

6. American Merganser - A total of 5 broods in 1952; 16 in 1953.

This increased brood production is more apparent than real, due to a more intensive coverage of Lake Umbagog and surrounding waters in 1953. Some knowledge of its relative abundance in this area has thus been gained.

Table I - Number of Broods and Potential Broods Observed in New Hampshire in 1952 and 1953
Based on Comparable Coverage

SPECIES	NORTH		WHITE MTS.		CONN. VALLEY		LAKES		SOUTH-EAST		SOUTH-WEST		COASTAL		TOTAL	
	1952	1953	1952	1953	1952	1953	1952	1953	1952	1953	1952	1953	1952	1953	1952	1953
Black duck																
Broods	12	8	11	3	7	5	8	9	11	12	11	14	4	2	64	53
Potential Broods	2	1	2	1	1	0	5	13	4	5	9	6	1	1	24	27
Total	14	9	13	4	8	5	13	22	15	17	20	20	5	3	88	80
Wood duck																
Broods	4	2	3	4	4	3	19	12	18	16	13	17	3	1	64	55
Potential Broods	0	1	0	2	1	1	11	41	4	14	9	13	4	6	29	78
Total	4	3	3	6	5	4	30	53	22	30	22	30	7	7	93	133
Ring-necked duck																
Broods	1	2	5	10	0	0	0	0	0	0	0	0	0	0	6	12
Potential Broods	1	2	1	2	0	0	0	0	0	0	0	0	0	0	2	4
Total	2	4	6	12	0	0	0	0	0	0	0	0	0	0	8	16
Goldeneye																
Broods	13	10	0	0	0	0	0	0	0	0	0	0	0	0	13	10
Potential Broods	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	13	11	0	0	0	0	0	0	0	0	0	0	0	0	13	11
Hooded Merganser																
Broods	12	7	0	0	0	0	4	3	1	0	2	1	0	0	19	11
Potential Broods	1	7	0	0	0	0	1	8	0	0	0	0	0	0	2	15
Total	13	14	0	0	0	0	5	11	1	0	2	1	0	0	21	26
American Merganser																
Broods	5	14	0	0	0	0	0	1	0	0	0	0	0	0	5	15
Potential Broods	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	5	15	0	0	0	0	0	1	0	0	0	0	0	0	5	16
Mallard																
Broods	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0
Potential Broods	0	0	0	0	0	0	0	0	0	1	0	4	0	0	0	5
Total	1	0	0	0	0	0	0	0	0	1	1	4	0	0	2	5
TOTAL BROODS	48	43	19	17	11	8	31	25	30	28	27	32	7	3	173	156
Total Potential Broods	4	13	3	5	2	1	17	62	8	20	18	23	5	7	57	131
Grand Total	52	56	22	22	13	9	48	87	38	48	45	55	12	10	230	287

TABLE II - Average Number of Young Per Brood by Species and Age Class 1952-1953
(Size of Sample Shown in Parentheses)

Species	1953 Age Class I	1953 Age Class II	1953 Age Class III	1953 All Age Classes	1952 All Age Classes
Black duck	5.4 (5)	4.6 (21)	5.4 (24)	5.0 (50)	7.75 (16)
Wood duck	6.6 (12)	4.7 (15)	4.5 (4)	5.4 (31)	6.24 (25)
Ring-necked duck	4.6 (5)	7.2 (4)	3.0 (2)	5.3 (11)	6.12 (8)
Goldeneye	8.3 (7)	4.7 (3)	6.8 (7)	7.0 (17)	5.90 (7)
Hooded Merganser	7.0 (4)	4.4 (5)	2.0 (1)	5.2 (10)	7.30 (7)
American Merganser	--------	7.0 (14)	2.0 (1)	6.7 (15)	10.60 (5)
Dabblers	6.2 (17)	4.6 (36)	5.2 (28)	5.2 (81)	---------
Divers	6.7 (12)	6.1 (7)	6.0 (9)	6.3 (28)	---------
Mergansers	7.0 (4)	6.3 (19)	2.0 (2)	6.1 (25)	---------

7. Mallard - A total of 2 broods in 1952; 5 in 1953.

The brood figures for 1953 are all based upon potential broods as represented by mallard females. Whereas in 1952, two broods were actually observed, no broods were seen this year. Thus, the indicated increase in this species is more speculative than actual.

Summary of Banding Operations

A somewhat more intensive amount of banding of female wood ducks was carried out this year. A total of 36 was banded in the nest box on selected areas in the State. Three female Hooded mergansers were similarly banded. Twenty immature Wood ducks were banded at 3 different sites.

WATERFOWL BREEDING GROUND SURVEY IN MARYLAND

William R. Nicholson

Introduction

The aerial transect method of obtaining brood production indices was used in Maryland in 1953. This method was first used in 1952 and is described in the Breeding Ground Report for that year.

In addition to the production surveys, a study was made of the black ducks nesting in the Parson Island area of Eastern Bay. This work was done by Vernon L. Stolts, who at the present time is a graduate student at the University of Illinois.

Methods Used in Sampling and Area Covered

Aerial Transect

Several revisions were made in the aerial transect surveys that were conducted in 1953. These revisions were based mainly on the results obtained during the previous year. Many unpopulated regions were eliminated from the survey. Large contigious marshes were sampled by transects 1/8-mile wide. Areas with irregular and heavily indented shorelines were sampled by counting broods on a percentage of the total shoreline, which had previously been determined from large scale maps.

All the areas surveyed were considered as unditched estuarine marsh, with the exception of the ditched coastal marsh between Chincoteague and Assawoman Bays.

Nesting Study

The nesting study was confined to two islands and part of the nearby mainland in the northern part of Eastern Bay, in Queen Anne County.

Parsons Island, the larger of the two, is approximately 125 acres. About 70 acres is formed; the rest is woodland and marsh. Bodkin Island is about five acres. It is entirely wooded and has an understory of poison ivy and honey-suckle which forms thick tangled growths. No mammalian predators are known to occur on either of the islands. The vegetation on the mainland is similar to that found on the islands.

The islands and mainland were regularly searched for nests from the last week in March until the middle of July. Nests were observed until they had hatched or were destroyed.

Success of the Season

Aerial Transects

Nearly all of the flights made in 1952 were for reconnaissance purposes. The revisions made in 1953 were so extensive that none of the data are comparable for the two years. Therefore, only the results of this year's flights are presented.

A large block of marsh totaling 106 square miles in the Elliot Island - Blackwater River region of Dorchester County was selected for weekly surveys which were started June 8 and which ended July 24. Six flights were made during the period.

The results of these flights are listed in Table I. The number of broods seen on the first three flights remained nearly static, with no significant changes. The increase in the number of broods seen on July 9 and 16 is probably due to the fact that more broods had reached the Class III stage. These older broods were less inclined to seek cover than were young birds and spent more time in open water where they could be seen. The flights of June 8 and July 2 are not strictly comparable with other flights, however. The one on June 8 was made in late afternoon instead of early morning and the July 2 flight was made in late morning. By July 24 it was almost impossible to distinguish broods from small groups which may have been the chance association of individuals from different broods, or even adult birds. Flocks of 15 or more birds were common.

Table II shows the results of the transects on the other areas. No broods were observed on the Choptank and Nanticoke River marshes. Few broods and adults were seen on the marshes comprising the Wicomico-Deal Island and Fairmont-Crisfield areas. These marshes are mostly the needlerush-salt meadow type and contain few ponds that do not drain at low tide. The Taylor Island-Honga River area is a continuation of the Blackwater-Elliot Island region over which weekly flights were made.

The results of the flights which were conducted on a shoreline basis are summarized in Table III. It should be noted that the figures listed under the totals do not include the results of the second flight made in Talbot and Queen Anne Counties. These figures are omitted, since it appears that the results of the July 11 and 15 flights better reflect the actual conditions. By July 24 it was difficult to recognize broods. Many birds were flying or had combined to form large groups.

Nesting Study

A total of 161 nests were found in the Eastern Bay study area. Seventy-one were located on Parson Island, 76 on Bodkin Island, and 14 on the mainland. Of the total number, 129 were located in wooded areas. The rest were located in marsh sites.

Nesting began during the last week of March and ended the second week of July. The first nest hatched on April 24 and the last nest hatched on August 1. Although the hatching dates were spread quite evenly, a slight peak was apparent in May.

Only 52 of the 161 nests were successful. Fifty-nine nests were destroyed by crows, and 13 others are believed to have been destroyed by crows. Twenty-nine nests were abandoned by the females. Eight others were flooded by high tides.

Considering the number of unsuccessful nests, many renests must have occurred. Observations indicate that hens may renest three or four times. Renesting may occur even if the nest is destroyed during the late stage of incubation. One hen which had been marked had her nest destroyed by crows when the eggs were pipped. A week later the same hen was found laying another clutch, which was destroyed before it was completed.

Banding

Between June 19 and August 30, 128 black ducks were banded in Eastern Bay. Many of the birds were flightless young. These bandings are listed in Table IV.

Table I. - Results of Weekly Aerial Brood Counts on 106 Square Miles of Marsh in The Elliot Island-Blackwater River Area

Date	Time	Linear Miles of Transects	Square Miles of Transects	No. of Adults	No. of Broods	Broods per Square Mile	Average Brood Size	Production Index
6/8/53	5:00 6:40 A.M.	114	14.25	188	6	.421	5.67	252.9
6/15/53	6:33 8:15 A.M.	114	14.25	61	4	.281	*	--
7/2/53	8:05 9:35 A.M.	114	14.25	47	3	.211	*	--
7/9/53	6:30 8:30 P.M.	117	14.63	47	18	1.2 0	4.73	616.8
7/16/53	6:46 8:35 A.M.	114	14.25	107	26	1.825	5.36	1037.2
7/24/53	6:33 8:15 A.M.	114	14.25	187	10	.702	5.70	424.1

* Incomplete counts on all broods

Table II. - Results of Aerial Brood Counts on Tidal Marshes Using 1/8-Mile Transects

Location	Date Flown	Time Flown	Area in Sq. Mi.	Linear Mi. of Transects	Square Mi. of Transects	No. of Adults	No. of Broods	Broods Per Sq. Mi.	Average Brood Size	Production Index
Deal Island-Wicomico	7/10/53	6:15 8:10 A.M.	46	54	6.8	18	3	.441	5.00	101.4
Fairmount-Crisfield	7/10/53	9:20 10:30 A.M.	51	53	6.6	13	3	.445	4.67	106.0
Taylor Island-Honga River	7/10/53	6:30 7:15 P.M.	29	24	3	47	3	1.00	8.00	232.0
Nanticoke River	7/10/53	6:00 6:15	14	24	3	4	0	--	---	---
Choptank River	7/25/53	8:55 9:40 A.M.	8.5	21	2.6	2	0	--	---	---
Atlantic Coastal	7/16/53	6:15 7:20 A.M.	42	59	7.4	50	6	.811	5.33	181.6

Table III. - Results of Aerial Brood Counts on Tidal Areas Which Were Sampled On A Shoreline Basis

Location	Date Flown	Time Flown	No. of Miles of Shoreline	Miles of Shoreline Flown	% of Shoreline Flown	No. of Adults	No. of Broods	Broods per Mile of Shoreline	Average Brood Size	Production Index
Kent County	7/17/53	6:35 8:20 A.M.	268	115	42.9	230	19	.165	5.21	230.8
Little Choptank-Fishing Creek Region	7/10/53	7:50 8:25 A.M.	185	71	38.3-	12	8	.113	8.88	184.7
Talbot County	7/15/53	6:40 8:22 P.M.	473	211	44.6	9	16	.076	5.87	210.7
Talbot County*	7/24/53	6:35 8:10 P.M.	473	183	30.2	98	9	.063	7.70	229.5
Queen Anne County	7/11/53	6:10 8:00 A.M.	274	156	57.0	351	11	.071	6.45	124.5
Queen Anne County*	7/25/53	6:35 7:25 A.M.	274	131	47.8	330	10	.078	5.70	119.1
Total	--	--	1200	553	46	602	54	.098	6.20	729.1

* Omitted in Computation of Total

Table IV. - Black Ducks Banded in Eastern Bay

Immature			ADULT	
Male	Female	Undetermined	Male	Female
65	47	1	3	12

Summary

The data obtained in 1953 indicate that there is an excellent possibility of obtaining yearly indices to waterfowl production in Maryland by the use of aerial transects. Since no comparable data of previous years are available, no conclusions concerning the relative success of the 1953 season can be made.

The nesting study indicates a substantial resident black duck population in the Eastern Bay area. Heavy predation and considerable nest abandonment causes much renesting and spreads the hatching period.

WATERFOWL BREEDING GROUND SURVEY IN MAINE - 1953

Howard L. Mendall

The results of the 1953 waterfowl breeding studies in Maine are summarized in this report. Each year this work is conducted by the personnel of the Maine Cooperative Wildlife Research Unit under the supervision of the writer. He was assisted by Malcolm W. Coulter. Other members of the Unit staff who participated in the study were Claude Z. Westfall and David C. O'Meara. During the nest hunting activities John M. Dudley of Calais was employed as field assistant. Considerable additional data for this report were supplied by J. William Peppard, waterfowl project leader of the Maine Department of Inland Fisheries and Game; appreciation is herewith expressed for his cooperation.

Coverage and Techniques

Previous reports of this series have described Maine's waterfowl breeding habitat, and also the methods used in conducting the study. Coverage and techniques in 1953 were practically the same as in previous years, so the data are comparable.

Breeding Populations

The over-all waterfowl population at the start of the nesting season showed a slight, but not serious, decrease in 1953. This followed six consecutive years of an increase. The black duck - most important species in Maine - again registered a slight increase, but this was offset by losses among other species. Decreases were recorded for both the ringnecked duck and the wood duck.

The American goldeneye and the two teal showed little change from last year, although their numbers are not sufficiently high on the census areas to permit accurate measurement. Apparently the teal reversed their trend of a year ago - with an increase in 1953 for the green-wing and a decrease for the blue-wing.

The status of the initial population of the six species of breeding ducks is as follows:

Species	Status in 1953
Measured on Census Areas	
Black duck	9 percent increase
Ring-necked duck	8 percent decrease
Wood duck	31 percent decrease
Estimated	
Green-winged teal	Slight increase
American goldeneye	No change
Blue-winged teal	Slight decrease

General Breeding Conditions

For the most part the 1953 breeding season was less favorable than that of a year ago. The spring break-up of ice occurred at very early dates on all rivers and

streams and on most of the lakes as well. Late March and the first two weeks of April produced temperatures that were considerably above average. This period was followed by nearly three weeks of cool, wet weather. A few instances of very early breeding by black ducks was noted, but on the whole, nesting for all species occurred only slightly earlier than in an average year.

Heavy rains in late April and again in mid-May caused more nest losses, particularly among the black duck, than was the case a year ago. Breeding ducks in eastern and central Maine were most seriously affected by the floods. Such losses were evident, in part, among nests that were being kept under observation. They were even more apparent from the brood study when a number of very late hatches of black ducks were recorded. Ring-necked ducks and teal (nesting later than blacks) did not appear to be greatly affected by the floods.

Following the heavy precipitation of April and May, very little rainfall occurred during late spring and most of the summer. Water levels dropped very rapidly in June and July. This resulted in a deficiency in rearing cover in many of the marshes, thus having a further adverse effect on the season's productivity.

Nesting Success

A total of 91 nests was found during the nesting study. Aside from one nest of the American goldeneye, all were of three species: ring-necked duck, black duck, and wood duck. Eggs from one ringneck were collected for hatching in an incubator. All other nests were kept under observation until hatched or destroyed.

From the sample of 90 nests, hatching success for all species was 60 percent. This is substantially lower than a year ago, and lower than the long-term average. Success dropped off sharply for the black duck, being only 52 percent as compared with 64 percent in 1952. Ringnecks and wood ducks likewise were less successful in nesting this year.

Flood losses, as a source of nest loss, have already been mentioned. As was the case in 1952, principal losses from predation were by the raccoon and mink. Also, as in 1952, crows were only a minor factor.

The Brood Season

As would be expected with the increased nest losses that resulted in more re-nesting, the brood sizes at hatching were smaller than a year ago. Rearing conditions were not as favorable as usual this year, and data on subsequent age classes of ducklings were progressively lower.

There were 134 records of complete broods in 1953 available for comparison. These were broken down as follows: Class I - 42 broods, Class II - 62 broods, Class III - 30 broods. The average of Class I broods was 7.1, only a little lower than the 7.4 figure of a year ago. Of much greater concern was the big difference between the two years in the Class III broods - those approaching the flying age. In 1952 the figure was a record high of 6.1 while this year it dropped to only 4.9. The number of Class III broods that was tabulated was practically the same in both years.

Summary and Conclusions

1. The population of breeding waterfowl in Maine at the start of the 1953 nesting season was a little lower than a year ago. The black duck was increased, but these gains were offset by losses to the ring-necked duck and the wood duck.

2. Breeding conditions were not as good this year as in 1952, largely because of a very wet spring and a very dry summer. The water was too high for optimum nesting conditions but dropped rapidly until it was too low for good rearing success.

3. Nesting success was appreciably below that of a year ago. Broods likewise were smaller in size in 1953, especially those approaching flying age.

4. Although no serious decline in the numbers of breeding waterfowl in Maine was indicated for 1953, it is likely that over-all productivity was appreciably less than in 1952.

Table I. - Waterfowl Census Data - Number of Breeding Pairs

Study Area	Black Duck Pairs		Ring-neck Pairs		Wood Duck Pairs	
	1952	1953	1952	1953	1952	1953
St. John River, Van Buren	9	10	-	-	-	-
Portage Lake	5	4	17	18	3	4
Meduxnekeag Stream, Hodgdon	4	5	-	-	2	3
Musquash Stream, Grand Lake Stream	11	20	9	13	-	-
Pocamoonshine-Crawford Lakes	40	45	80	55	11	4
St. Croix River, Baring	10	12	-	-	5	3
Moosehorn Refuge, Calais	31	31	9	4	-	-
Pennamaquan River, Pembroke	5	5	12	18	-	-
Mattanawcook Lake, Lincoln	3	1	4	6	-	-
Penobscot River, Lincoln-Enfield	15	16	-	-	10	7
Pushaw Stream, Orono-Old Town	4	6	-	-	3	3
Davis-Holbrook Thorofare, Eddington	5	5	4	4	-	-
Corinna Stream, Corinna	8	7	10	14	9	4
Goose River, Belfast-Swanville	11	8	15	12	-	-
Snake Pond, Brooksville	-	-	2	5	-	-
Boyden Lake, Perry	-	-	-	-	2	1
Ruffingham Meadow, Searsmont	-	-	-	-	10	8
Scammon Marsh, Eastbrook	-	-	-	-	6	5
Total	161	175	162	149	61	42

WATERFOWL BREEDING GROUND SURVEY IN THE NORTHEASTERN STATES

Francis B. Schuler

Introduction

The information contained in this report on summer production was collected from Service and State personnel and private cooperators in the same manner as last year.

While the number of comparable areas available is lower than a year ago, the coverage is substantially the same. New Hampshire and Massachusetts, in their respective canoe survey and wood duck box check, submitted data that adequately covered the State but was reduced in intensity. No information was available from Pennsylvania. Last year reports were received from 19 areas in this State.

Weather and Water Conditions

Throughout the entire Northeast rainfall from late winter and through the third week of May was far above normal. As an indication, rainfall in Massachusetts was in excess of 14 inches above average for the period ending May 30. In general the high water levels were consistently maintained during this period. Average mean temperature during the same interval was below normal. Despite the generally lower temperatures, vegetative growth was advanced slightly over last year. This may be attributed to the lack of severe temperatures in late winter and early spring.

Since the last week in May most of the region has been below normal in rainfall with drought conditions being common now in the Northeast. High temperatures and humidity have been fairly constant through June.

The abnormal high tides experienced last spring on the productive coastal marshes did not occur this year.

Breeding Population Trends

Observers from widely scattered portions of the region felt that there was an ample supply of breeding pairs of blacks and wood ducks for satisfactory local production. The absence of generally low temperatures during the late winter and early spring probably accounted for the earlier nesting than last year. This season was ahead of last year and much earlier than normal. The heavy rain after nesting had begun apparently drowned many nests. While the rains were general over the region, the nesting losses from this factor appeared variable; some observers reported this condition while others did not feel it important. The varied terrain in the Northeast may account for this. Where flooding has occurred many observers reported renesting and to a substantial degree.

Brood Production Trends

A summary of production data from 130 comparable areas is presented in Table I.

Table I. - Summer Brood Survey in the Northeastern States, 1953 (130 Comparable Areas *)

Species	Total Broods		Young Produced		Average Brood		Percent of Change			
							Young Produced		Broods	
	1953	1952	1953	1952	1953	1952	Increase	Decrease	Increase	Decrease
Black duck	337.0	340.0	2125.7	2352.0	6.3	6.9	-	9.6	-	1.0
Wood duck	393.0	364.0	3838.9	3154.5	9.5	8.6	21.7	-	7.9	-
Mallard	44.0	44.0	311.0	254.0	7.0	5.7	22.4	-	No change	
B-w. teal	25.0	11.0	184.0	77.0	7.3	7.0	139.0	-	127.0	-

* Number of areas by States: Connecticut 24; Delaware 6; Maine 13; Maryland 1; Massachusetts 40; New Hampshire 10; New Jersey 10; New York 7; Rhode Island 14; Vermont 1; West Virginia 4.

The trend to smaller broods of black ducks is documented by observer reports of flooding of early nests and a resulting renesting with smaller broods being produced. While the numbers of broods did not decrease significantly, the brood size did influence total production as represented in Table I. The decrease noted in production, however, is not significant and from area reports appears to be confined primarily to areas in Rhode Island. An indication of this bias in the data can be shown if the Rhode Island reports (14 areas) representing 105 broods in 1952 and 60 broods in 1953, were deleted from Table I, the picture would be completely changed. Production from the remainder of the region would then read 235 broods in 1952 and 277 broods in 1953, or a 17 percent increase in black duck production over the last year in the remainder of the region, with an average brood size of 7.1 in 1952 and 6.2 in 1953. This is more nearly the picture of production trends in the region for the black duck.

Wood duck production data, both in brood size and young produced, show a general increase throughout the region for the second successive year.

Mallard production data, while admittedly meager, has some significance -- reports from coastal marshes indicate a decrease, as in the case of the black duck, while the interior areas show a substantial increase. There is a paucity of data on other species. The reports submitted indicate an increase for the blue-winged teal and Canada goose.

Summary

Over-all production has increased over last year. There has been a moderate increase in black ducks. Wood duck production has shown a definite increase. Trend data, though limited on other species, shows an increase for blue-winged teal and Canada geese, with the ring-necked duck the only recorded species registering a decrease.